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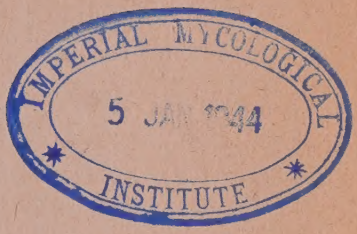

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IMPERIAL BUREAU OF ANIMAL HEALTH

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VETERINARY BULLETIN

Vol. 14.] January, 1944. [No. 1.

DISEASES CAUSED BY BACTERIA AND FUNGI

DURFEE, O. (1942). **Classification of 110 Strains of *Staphylococcus aureus*.**—*J. Bact.* **44.** 589–595. †1

Using the methods of COWAN and JULIANELLE for the study of the antigenic structure of a collection of haemolytic staphylococci of human origin, D. found that most of the strains belonging to the Cowan groups I and III produced Julianelle A polysaccharide.

There is described a group of staphylococci proved distinct from Cowan's groups I, II, or III by agglutinin absorption tests. Only 10% of all cultures examined belonged to Cowan's group II, but of leucocidin-producing strains, 55% belonged to this group and of these a high percentage produced a lessened amount of group A polysaccharide.—D. L. ROBARTS.

FULTON, F. (1943). **Staphylococcal Enterotoxin—With Special Reference to the Kitten Test.**—*Brit. J. exp. Path.* **24.** 65–72. 2

The validity of the kitten test for the identification of enterotoxigenic staphylococci was studied. Of four strains of staphylococci isolated from as many outbreaks of food poisoning, three failed to give a positive kitten test. These produced only α-lysin, whereas the kitten-positive strain produced also a β-lysin. Moreover, two strains giving negative kitten tests produced poisoning in human volunteers. Hence the kitten test was shown not to detect the same factor as causes food poisoning in man. The lysins were next purified and it was found that both the α- and β-lysin was toxic for kittens, but only the β lysin escaped destruction by boiling. Purified α-lysin proved non-toxic to human volunteers. It was also found that the intraperitoneal injection of kittens with substances such as mustard oil or meat or fish foods caused vomiting. Although the β lysin was found non-toxic to human beings when given by mouth, this lysin was found to be the factor responsible for vomiting in kittens. Also, an extract toxic to the human being was found to be inseparable from the α-lysin.—D. L. R.

SPINK, W. W., & VIVINO, J. J. (1942). **The Coagulase Test for Staphylococci and its Correlation with the Resistance of the Organisms to the Bactericidal Action of Human Blood.**—*J. clin. Invest.* **21.** 353–356. 3

Of 32 coagulase-positive strains of staphylococci from human beings with severe infections, all but one resisted the bactericidal action of normal defibrinated blood. Of 11 strains of coagulase-negative staphylococci from low-grade infections, all were killed in large numbers by normal defibrinated blood. Four coagulase-positive strains subcultured over a period of four years lost their ability to coagulate plasma and, coincident with this, their resistance to the killing power of blood. A close correlation is thus seen to exist between the ability of a strain to coagulate plasma and to resist the bactericidal action of blood.—D. L. ROBARTS.

SOLOWEY, M. (1942). **A Serological Classification of Viridans Streptococci with Special Reference to those Isolated from Subacute Bacterial Endocarditis.**—*J. exp. Med.* **76.** 109–126. 4

108 strains of *viridans* streptococci isolated from cases of subacute bacterial endocarditis in man and 99 strains from human throats and extracted teeth were examined serologically, the Lancefield precipitin technique being used. Although only two of these strains fell into groups previously described, 66% of the remaining strains could be classified into four groups (unrelated to Lancefields groups A–K). Streptococci from both main sources fell into these four groups in roughly equal numbers of which about three-quarters proved biochemically to be *Str. salivarius*. Only one of 15 strains of *viridans* streptococci isolated from the vagina fell into any of the four groups. It is interesting to find that strains biochemically and serologically identical (many of them *Str. salivarius*) were isolated both from heart valves and the human throat.—D. L. ROBARTS.

VAN RENSBURG, S. W. J. (1941). **The Diagnosis of Chronic Streptococcus Mastitis.—Reaction, Chlorine, Methylene Blue and Hotis Tests, and Microscopic Examination.**—*Onderstepoort J. vet. Sci.* **16.** 69–102. 5

The results obtained with the above five tests in cases of streptococcal mastitis in a number of herds in South Africa are recorded and discussed. In his introduction, the author mentions that abnormal milk may be obtained from clinically normal udders, in the absence of streptococci. On the other hand, a continuous infection with streptococci may occur without clinical changes in the udder.

In tests on the reaction of milk it was found that universal indicator is superior to brom-thymol-blue for detecting the degree of alkalinity. Estimation of the reaction of mastitis milk was only of limited value in the diagnosis of chronic streptococcal mastitis.

The chlorine determination test detects a higher percentage of mastitis-infected quarters than the alkalinity tests, but gives a high percentage of false positives.

Although the reduction time of methylene blue is markedly lowered by mastitis streptococci the methylene blue reduction test cannot be considered as specific for mastitis, as lowering of the reduction time is caused not only by mastitis streptococci or by pathogenic bacteria, but may be effected by various contaminating organisms as well.

The Hotis test was found to fail to reveal a large percentage of infected samples and also to yield a large number of false positives. Reliance can only be placed on the test if it is confirmed by microscopic examination.

As to microscopic examination, it was found that smears from fresh milk or even centrifugalized milk were of little use for diagnosis, but incubated milk revealed infection in 93·6% of cases against 88·8% detected by cultural examination. The value of incubation is not improved after 18 hours.

The cell content of the milk is a useful indication

* In certain cases it is impossible to check references in the original publication. Such references are marked with an asterisk.

† The serial numbers printed in black type after each title are intended to help the reader to find quickly all the abstracts on a given subject which appear in any one number of the *Bulletin*. Thus, in order to find in the January number all the abstracts dealing with bacteria and fungi which are, for various reasons, assigned to sections other than "Diseases Caused by Bacteria and Fungi," it is necessary only to refer to the list of abstract numbers given in small type at the end of that section, on page 5.

of the extent of the changes in the quarter and in the milk.—E. M. ROBINSON.

NUNHEIMER, T. D., & FABIAN, F. W. (1942). **Respiratory Studies of the Micrococci.**—*J. Bact.* **44.** 215–232. **6**

The dehydrogenase activity of five species of micrococci was studied, methylene blue and molecular oxygen being used as hydrogen acceptors with a variety of substrates (sugars, alcohols, and amino-acids). The effect of various substances as respiratory inhibitors was tested and found to vary with the species of organism under observation. The influence of inhibitors upon dehydrogenases and upon oxygen uptake by micrococci and of methylene blue upon cyanide inhibition is described, as well as a search for other respiratory enzymes of micrococci.—D. L. ROBARTS.

STERNE, M., & ROBINSON, E. M. (1939). **The Preparation of Anthrax Spore Vaccines (for Cattle and Sheep) in South Africa.**—*Onderstepoort J. vet. Sci.* **12.** 9–18. **7**

After describing the method of vaccine production carried on for some years at Onderstepoort, the authors mention a few changes made in the technique to attempt better standardization. Peptone, which had previously been omitted from the media, was reintroduced with improvement in sporulation as a result. A suspension of spores from agar was used for inoculating the flasks instead of a broth culture, as the latter causes unwanted dissociants. Certain changes were made in the virulence and immunity tests in rabbits, g. pigs, and sheep. The danger of relying solely on laboratory tests even on sheep and goats is emphasized and only field tests will give reliable information on what may be expected of a vaccine under field conditions. This is particularly true in goats which, under stabled conditions, can be inoculated safely with vaccines which may prove fatal to them in the field.

The general tendency with vaccines recently produced has been to increase the attenuation while increasing the concentration of the spores in the vaccine. This has resulted in a lower number of reports of adverse results from vaccination, although such reports were relatively very few before.—E. M. ROBINSON.

PALMEIRO, J. M. (1942). A reacção de Ascoli, considerada como reacção de grupo e insuficiente para o diagnóstico do carbúnculo. **[Value of the Ascoli Test for Anthrax].**—*Repos. Lab. Pat. vet., Lisboa.* **5.** 99–103. **8**

P. states that the Ascoli test was found to be unreliable in the diagnosis of anthrax. Positive reactions were obtained in some cases in which anthracoid organisms alone were concerned. The test, therefore, should be supplemented by the isolation of organisms and their identification by biochemical and biological tests.

—ISOBEL W. BURTON.

*JENSEN, K. A., & LESTER, V. (1941). **Studies on the Types of Tubercle Bacilli Isolated from Man. VI. Supplementary Studies on the Cases Described in Report V and Some New Cases of Mixed Infections.**—*Acta tuberc. scand.* **15.** 15–46. [? In English]. [Abst. from abst. in *Amer. Rev. Tuberc.* **45.** No. 2. p. 35 of absts.]. [Previous parts not traced]. **9**

The proportion of the numbers of human and bovine type cultures from mixed infections may vary considerably within such a short period as one week. Two cases are presented in which bovine type bacilli were recovered from the lung and later human type bacilli were found. Examples are given of atypical properties of growth and virulence of bovine strains obtained from mixed infections. These bovine strains show a great tendency to dissociation in a pure culture. Mixed infections are probably due not only to superinfection with the human type bacillus, but also to dissociation of the bovine type in the human body.

*NIELSEN, F. W. (1942). Tuberkulinreaktioner og Dobbelinfektioner. **[Tuberculin Test Reactions and Mixed Type Tuberculosis Infections in Cattle].**—*Maanedsskr. Dyrlaeg.* **53.** 497. [Abst. from abst. in *Skand. VetTidskr.* **32.** 375 and 377]. **10**

N. discusses infection with the mammalian and avian types of tubercle bacilli in cattle and their differential diagnosis by the comparative test. He insists that if the reaction to mammalian is greater than that to avian tuberculin then bovine or human type infection must be present. In these circumstances, a P.M. examination of one or more reactors should be made in an endeavour to define the type. In general, the absence of macroscopic lesions signifies human type infection.

[The literature on this subject of differential diagnosis of TB. in cattle as published by workers in Sweden, Denmark, and especially in the English-speaking countries, seems to indicate that the methods practised so successfully in Finland are not being employed in their entirety. This omission is multiplying the dangers which beset the tuberculosis eradication schemes today.]—G. B. BROOK.

FLÜCKIGER, G. (1943). Ausserordentliche Massnahmen zur Bekämpfung der Rindertuberkulose. **[Special Control Measures for Bovine TB. in Switzerland].**—*Schweiz. Arch. Tierheilk.* **85.** 141–151. **11**

The Federal Bureau decided to apply the following regulations, to take effect from March 16th, 1943. In areas where TB. is not prevalent, reactors are to be slaughtered, and healthy cattle are to be used to build up TB.-free herds. In areas with a moderate degree of infection, segregation is to be adopted; reactors are to be isolated and disposed of gradually. In areas where the disease is rife, the responsibility for culling open cases of TB. and for maintaining, as far as possible, the best hygienic conditions for the cattle, is laid upon the stockowner.—A. R. JENNINGS.

BAISDEN, L., & YEGIAN, D. (1943). **The Destruction of Acid-Fastness of the Tubercle Bacillus by an Autolytic Process.**—*J. Bact.* **45.** 163–166. **12**

Evidence is presented indicating that tubercle bacilli (human type strain H37) contain an autolytic agent which manifests its presence only after the organisms have been treated with alcohol-ether (lipoids extracted) and suspended in water. The alcohol-ether extraction did not affect the morphology or acid-fast properties of the organisms, but 48 hours' incubation at 37°C. of a distilled water suspension of the extracted bacilli resulted in marked autolysis and loss of acid-fastness. Experimental evidence indicated that the optimum temperature for autolysis was 37°C., that the autolytic agent of the extracted bacilli was destroyed by high temperatures (90°C. for 10 min.), that the optimum pH for autolysis lay between 5·2 and 7·0 and that traces of iodine and formaldehyde completely inhibited the process. The authors conclude that the properties of the autolytic agent are very similar to those of certain well recognized enzymes.—J. LOCHIEL MCGIRR.

MELLON, R. R., & HAGAN, M. L. (1942). **The Polyphasic Potencies of the Bacterial Cell; General Biologic and Chemotherapeutic Significance.**—*J. Bact.* **44.** 1–26. **13**

Throughout the course of subculture for four years on different media at regular intervals of about a month, a streptothrix of partly acid-fast character, which was isolated from an anomalous form of TB. in a human being, affecting mainly the skin, lymph nodes, and bones, was shown to have several modulant phases, derived

by appropriate environmental selection from pleomorphic forms, the colonies of which exhibited a wide range of appearance and consistency. Collectively, these were regarded as occupying a position in the dissociation cycle of the tubercle bacillus intermediate between its acid-fast, critical, rough stage and its non-acid-fast coccus stage. The results of cross-agglutination tests with the various phases and antisera produced against each phase suggested that each modulant phase of the streptothrix had elaborated its own fragment of an antigenic mosaic, which, when pieced together, served to bridge the antigenic gap normally existing between the two extreme phases of the tubercle bacillus.

The modulation category of variability, defined by the authors, was closely integrated with the mode of action of the sulphonamide compounds, which did not appear applicable to the other variation categories such as that of dissociative variation. Following an exhaustive discussion of their own and analogous experimental results, the authors comment upon the inadvisability of postulating the existence of genetic variation amongst bacteria until reliable criteria have been evolved for differentiating true mutation from the environmentally produced bacterial dissociations.—R. O. MUIR.

EVELETH, D. F., & GIFFORD, R. (1943). **Johne's Disease in Farm Animals.**—*J. Amer. vet. med. Ass.* **102.** 27–34. **14**

The results are summarized of intradermal tests with johnin on different species of animals. The johnin used came from the regional laboratory, Auburn, Alabama.

Results are shown in a table of animals tested in Arkansas. The percentages of reactors were 37·77 out of 940 cattle, 43 out of 874 sheep, 24·95 out of 63 goats, 32 out of 75 pigs, 39·3 out of 89 horses and 93·6 out of 47 mules. A few cats and chickens tested yielded negative reactions. Acid-fast organisms were found in the intestinal tissue in 50% of the reacting cattle, sheep and pigs examined P.M. Where more than one of the above species of farm animals was tested on a farm which showed infection, all species showed reactions.

It is suggested that there are not sufficient data to justify the slaughter of reactors as a measure of control, but that the elimination of clinical cases keeps the incidence of the disease low.

Pigs reacting to johnin were always associated with cattle or sheep. Johne's disease in sheep is not a very serious condition. No clinical symptoms were noted in solipeds which reacted, and no lesions were found P.M.

It is pointed out that organisms may not be demonstrable P.M. in a reactor, even though intensive search is made. In view of the large area of intestinal surface to be examined, this is not surprising.

The authors have observed positive tuberculin and johnin reactions in cattle which showed no signs of TB. at autopsy. These were probably infected with Johne's disease and reacted falsely to tuberculin.

Sheep and goats reacting to johnin did not react to tuberculin.

The clinical manifestations of the disease in cattle are described.—J. A. GRIFFITHS.

DUBIN, I. N., & KERBY, G. P. (1943). **Bacillus Coli Pneumonia.**—*Arch. Path.* **35.** 808–818. **15**

This article includes a brief review of cases of pneumonia in man, associated with *Bacterium coli* infection. There is a detailed description of one new case; the pneumonic lesions were fibrinopurulent in character and were considered not to have been due to a virus, toxin, or chemical poison. The intratracheal injection of viable *Bact. coli* in rabbits caused an interstitial pneumonia with mononuclears predominating and areas of focal necrosis. Similar, but less severe lesions, were produced by heat-killed cultures and by lysed growth. It is considered that a *Bact. coli* toxin plays a part in the production of the lesions and that the reaction to the organism in the rabbit differs from that in man. The route by which the organisms reach the lungs in man is discussed and in the case described the most likely route is considered to have been aspiration. The other possibility is transference from the gastro-intestinal tract by the bloodstream.—E. G. WHITE.

BRUCE, R. A., & DASCOMB, H. E. (1943). **An Anaerogenic Variant of *Salmonella enteritidis* (Gaertner) Isolated from an Enzootic Among Domestic and Wild Rats.**—*J. infect. Dis.* **72.** 157–159. **16**

Normal and experimental rats of the Wistar strain were recently found to be dying, and examination of some of these and also of wild rats trapped on the same premises showed a non-gas-producing strain of *S. enteritidis* to be concerned. Nine strains were recovered over a period of nine months. Two healthy carriers were found, and the probable source of infection was indicated by the presence of the organism in one of the wild rats. The strains closely resembled *S. typhi* in fermentation reactions. The organisms were motile, reduced nitrates, formed H_2S, and produced an alkaline reaction in litmus milk. None of the strains formed indole or liquefied gelatin. The organism was identified as *S. enteritidis* with antigenic structure IX, XII : g, m . . .

The authors state that other workers have found the following non-gas-producing variants of gas-producing species of *Salmonella*: a single strain of *S. cholerae-suis*, nine strains of *S. schottmuelleri*, a number of strains of *S. typhi-murium*, and a single strain of *S. paratyphi* C. MEYER & MATSAMURA (1927) also isolated two such strains from wild rats, but did not designate the species.—E. COTCHIN.

GWATKIN, R., MOYNIHAN, I. W., TRAVES, C. W., & ROACH, W. (1941). **Comparison of the Whole Blood and Tube Agglutination Tests for Pullorum Disease.**—*Sci. Agric.* **21.** 335–349. **17**

A comprehensive review is given of the literature concerning serological testing for the diagnosis of pullorum disease from 1913–40, along with previous comparative unpublished work by two laboratories employing the agglutination tube test and field tests by the whole blood plate method, on 2,375 birds. Greater agreement was found between the whole blood plate test and the tube tests made by one of the laboratories, than between the tube tests of the two laboratories. Nearly 7,000 comparative tests were completed during 1939–40. In order to eliminate any biased conclusions, the senior author assessed the results without taking any part in the actual testing. There was over 93% agreement between the two methods. A higher degree of constancy, however, was indicated by the whole blood plate method in retests. On the other hand, from the results of bacteriological examination of a small number of positive birds by each test method, there was evidence to indicate that there may be a higher percentage of non-specific reactions by the whole blood plate method than by the tube method.

—L. M. HEATH.

LORR, J. A., & BURROWS, W. (1942). **The Nutritive Requirements of the Salmonellas. IV. Studies on the Function of Amino Acids in the Growth of the Typhoid Bacillus.**—*J. infect. Dis.* **71.** 89–96. [For part I, see *V. B.* **11.** 153]. **18**

Experiments were designed to elucidate in part the role of amino-acids in the growth of the typhoid bacillus by determining whether tryptophane had a catalytic effect on the decomposition of glucose by the organism,

and whether a mutual oxidation and reduction of paired amino-acids occurred. The evidence obtained was in general not in favour of the actions hypothesized, but the original article should be consulted by those interested for a detailed discussion of the significance of the results.—E. COTCHIN.

DALLING, T. (1943). **Abortus Fever [Correspondence].**—*Brit. med. J.* May 29th. 677–678. **19**

In reply to criticisms of the Ministry of Agriculture's policy concerning vaccination, D. points out that there is no evidence that the attenuated vaccine strains of *Brucella abortus* are excreted in the milk. The control of *Br. abortus* infection by vaccination minimizes the risk of infection in the human population, by reducing the number of natur lly infected cows which excrete fully virulent organisms in the milk.—A. R. J.

CRAIG, J. F. (1943). **Some Observations on Contagious Abortion in Cattle.**—*Vet. Rec.* **55.** 25–28. Discussion pp. 28–29. **20**

A general discussion on the prevalence, epizoology, transmission, diagnosis, and control of bovine brucellosis. C. advocated eradication in lightly infected, self-contained herds, but in the case of TB.-free herds and valuable animals he advocated segregation as a practicable measure, provided that it is rigid and accompanied by systematic enforcement of measures to prevent infection of "clean" animals. Vaccination was recommended in the more heavily infected herds, to be followed by the eradication plan when the disease becomes quiescent. The various aspects were dealt with in considerable detail.—A. R. JENNINGS.

STONE, W. S. (1943). **Brucellosis in Swine.**—*Cornell Vet.* **33.** 115–119. **21**

Brucellosis in swine has occurred in several herds in New York State since June 1941, although previously no reactors had been detected in the state. Unlike contagious abortion of cattle, in the transmission of which the bull plays a relatively unimportant role, swine brucellosis is often spread to clean sows by an infected boar. *Br. suis* may infect cattle, but pigs appear resistant to *Br. abortus*. In individual herds, the number of abortions is variable and they are more frequent between the 60th and 90th days of pregnancy. Diagnosis is easily effected by means of the agglutination test. Results of attempts to immunize with bacterins and live cultures have been inconclusive and experiments with strain 19 are being conducted. There is considerable danger to human beings of infection with *Br. suis*.—S. J. GILBERT.

*TOSCHKOFF, A. (1941). **[Many Years' Observations on Agglutinins and Complement-Fixing Antibodies in Animals with Brucellosis].**—*Yearb. vet. med. Fac. Sofia.* **17.** 511–551. [In Bulgarian]. [Abst. from abst. in *Jber. Vet.-Med.* **69.** 597]. **22**

In 46% of naturally infected animals, especially those showing persistently high titres, agglutinins and complement-fixing antibodies persist in the blood serum for a period of 1–9 years, the former persisting longer than the latter. In animals with lower titres, antibodies are sometimes absent for a period, and even for several years. The agglutination test detects more reactors than the complement-fixation test. In healthy cattle, horses, sheep, goats, and pigs, agglutination rarely occurs at titres exceeding 1 : 20 and in exceptional cases 1 : 40. The rapid plate aggln. test for milk, milk serum, and blood is regarded as less satisfactory than the slow tube test. In narrow tubes, the c.-f. test is slower than in wider tubes. The zone phenomenon was observed more often in c.-f. tests than in aggln. tests.—A. M.

DOUGLAS, J. R., & WHEELER, C. M. (1941–43). **Sylvatic Plague Studies. I. A Convenient Individual Mouse Jar. II. The Fate of Pasteurella pestis in the Flea.**—*J. infect. Dis.* **69.** 29–31, and **72.** 18–30. **23**

EVANS, F. C., WHEELER, C. M., & DOUGLAS, J. R. (1943). **Sylvatic Plague Studies. III. An Epizootic of Plague Among Ground Squirrels (Citellus beecheyi) in Kern County, California.**—*Ibid.* **72.** 68–76. **24**

I. A description of a jar to house a single mouse or similar small animal, complete with a water bottle holder and a card holder and costing about 10 cents. Diagrams and details of preparation are given.

II. Two species of fleas, *Diamanus montanus* and *Xenopsylla cheopis*, were used in these studies. The authors found that with hosts (white mice) with optimum conditions as to the presence of organisms in the peripheral circulation, both *D. montanus* and *X. cheopis* ingested an average of 3×10^5 *Past. pestis* organisms per meal.

Past. pestis was absent from the alimentary canal of about 60% of *D. montanus* in 24 hours after a single infective meal, while in the case of *X. cheopis*, the intestine of only 2% was free at the end of 48 hours.

Multiplication of the organisms occurred in the oesophagus, proventiculus, and stomach of both species of fleas, but the occlusion of the alimentary tract occurred after ten days in *D. montanus* and 16 days in *X. cheopis*. The fleas were then infective and the infective period lasted five days in *D. montanus* and four days in *X. cheopis*.

The excretion of viable *Past. pestis* in the faeces of infected fleas is so slight that the authors do not think it can be of much significance in the transmission of sylvatic plague.

III. Five foci of sylvatic plague amongst squirrels were established in Kern County in 1941. The epizootic ran a separate course in each area and coincided with the period of dispersal of the young squirrels. The suggestion is made that the spread of the epizootic was limited by the sedentary habits of the squirrels.

Evidence is given that a true latent infection in squirrels was found and that fleas apparently provided a reservoir host for the sylvatic plague bacilli when the rodent population was low.—M. H. KYAW.

SCHLEIFSTEIN, J. I., & COLEMAN, M. B. (1939). **An Unidentified Microorganism Resembling *B. lignieri* and *Past. pseudotuberculosis*, and Pathogenic for Man.**—*N.Y. St. J. Med.* **39.** 1749–1753. [Reprinted in *Stud. Div. Lab. Res. N.Y. St. Dep. Hlth.* **10.** (1939–1942)]. **25**

The cultural, biochemical and pathogenic properties of a motile, Gram-negative bacillus with polar granules, which was isolated from three ulcerative conditions and two cases of enteritis in man, were compared with those of *Pasteurella pseudotuberculosis* and *Actinobacillus lignieresi*. Although similar in many respects, the bacillus differed materially from these micro-organisms and was particularly virulent for mice, in which characteristic but non-specific granulomatous lesions were produced. The ready infection of mice by the oral route suggested that rodents might possibly be a natural reservoir for the unidentified bacillus.—R. O. M.

WELCH, H., SLOCUM, G. C., & HERWICK, R. P. (1942). **Tetanus from Sulfonamide Dusting Powders. Development in Guinea Pigs Treated with Sulfanilamide Powder Contaminated with Washed Tetanus Spores.**—*J. Amer. med. Ass.* **120.** 361–364. **26**

In a preliminary experiment, 20 guinea pigs were inoculated with given numbers of washed tetanus spores placed in a skin pocket together with sulphanilamide powder. One of four g. pigs inoculated with 10,000 spores developed tetanus. Trauma, produced by direct

injury, by injection of *Staphylococcus aureus* or by kaolin + calcium chloride suspension, failed to produce tetanus in any of the surviving g. pigs.

In a second experiment, various doses of *Clostridium tetani* were given as before, along with sulphanilamide, but half of each group was also given a culture of *Staph. aureus*. One of five g. pigs receiving 100,000 washed spores, one receiving 100,000 spores and *Staph. aureus*, and four receiving 25,000 spores together with *Staph. aureus*, died of tetanus. The remainder survived and none developed tetanus when traumatized. Of the controls, given spores but no sulphanilamide, none died following injection of spores, but four died when traumatized ten days later.

The authors conclude that the inhibitory effect of sulphanilamide upon *Cl. tetani* is slight, and that it can act as a tissue debilitant so that when the drug packing a deep wound has been absorbed, any spores remaining can set up disease. Sterilization of sulphanilamide powder is advocated.—R. M. ARNOLD.

TRAUM, J., & SCHALM, O. W. (1942). **Actinomycotic-Like Clubs Associated with Coccidioidal Granuloma in Cattle.**—*Proc. 6th Pacific Sci. Congr., 1939.* **5.** 873–876. **27**

The authors discuss briefly the organisms known to produce lesions of the actinomycosis type, in which radiating club-shaped bodies can be demonstrated, these being *Actinomyces bovis* and possibly other species of *Actinomyces* (bone lesions in cattle), *Actinobacillus lignieresi* (soft tissue lesions in cattle), *Staphylococcus pyogenes* (mammary gland lesions in cows) and *Corynebacterium pyogenes* (bone and soft tissue lesions).

They refer to four cases of actinomycosis in cattle (two lung lesions and two thoracic lymph node lesions) in which *Coccidioides immitis* was the only organism present; radiating club-shaped bodies surrounding a double-contoured coccidioidal spheriole were present in those lesions and *C. immitis* was isolated from the lesions in pure culture.—M. L. BINGHAM.

EMMONS, C. W. (1942). **Coccidioidomycosis.**—*Mycologia.* **34.** 452–463. **28**

This article contains a summary of the available literature on the ecology, symptoms, lesions, and diagnosis of coccidioidomycosis, together with a description and illustrations of the multinucleate condition of the fungus, sporangiospore formation in the animal body, and the development of the conidiophores and conidia of the saprophytic growth form.—I. W. B.

RAHN, O., & RICHARDSON, G. L. (1942). **Oxygen Demand and Oxygen Supply.**—*J. Bact.* **44.** 321–332. [Authors' summary copied *verbatim*]. [See also *V. B.* **11.** 590.] **29**

The rate of multiplication of most bacteria remains constant only for a few hours because the dissolved oxygen of the medium is soon exhausted, and from then on, the rate of multiplication is constant only at the very surface where oxygen from the air is available. Experiments permit the calculation that oxygen does not penetrate deeper than 2 mm. Below this thin surface stratum, facultative anaerobes multiply more slowly while strict aerobes do not multiply at all; usually, they decrease in number.

Aeration does not necessarily increase the rate of multiplication, but it maintains it constant for a long time and thereby brings about a much larger bacterial crop. Aerated cultures may have 10 times as many bacteria as quietly standing cultures. With *Streptococcus lactis*, the number of cells is not greatly affected by aeration; pure oxygen decreases it.

The delayed start of aerated cultures is explained by the assumption that a solution saturated with oxygen is harmful to resting cells whose enzyme mechanism is not working at the normal rate of multiplying cells. An old cell in a new environment establishes a zone of optimal conditions in its immediate neighbourhood, probably at the expense of reserve compounds. If this is continually disturbed, e.g. by convection currents, the cell will finally die from exhaustion. The good growth on agar may be due merely to the prevention of convection currents.

CURRAN, H. R., BRUNSTETTER, B. C., & MYERS, A. T. (1943). **Spectrochemical Analysis of Vegetative Cells and Spores of Bacteria.**—*J. Bact.* **45.** 485–494. **30**

Emission spectrography was used to determine some of the inorganic chemical constituents present in bacteria. Dried, finely ground samples of 12 aerobic species were examined spectrochemically and the amount of K, Ca, P, Mg, Fe, Al, Cu, Mn, and B was determined in both the vegetative and spore stages. The quantitative composition of bacterial cells is influenced by the amount of washing they receive prior to their desiccation and analysis; it is therefore necessary to stop the washing when removal of extraneous cell substance is complete and before much loss of diffusible cell constituents occurs. Of the nine elements studied, Fe, Al, Cu, Mn, and B were present in relatively low concentrations, while K, Ca, P, and Mg were present in relatively high concentrations. For both Fe and Al, the concentrations ranged from about 30–600 p.p.m. and there were no consistent differences for these elements between vegetative and spore forms nor were there any notable differences among the major bacterial groups examined. Cu, and to a lesser extent Mn, was present in greater concentration in spores than in the vegetative forms. Spores were consistently higher in Ca and lower in K than the vegetative cells from which they were derived, while the reverse was found in regard to P. There appeared to be no direct correlation between the elemental inorganic composition and degree of resistance to heat, although high concentrations of Ca were associated with increased heat tolerance and resistance.—R. ALLCROFT.

See also absts. **259**, **267** (staphylococcus), **230**, **231** (streptococcus), **232**, **266** (mastitis), **261** (anthrax), **55–57**, **110**, **149**, **233**, **234**, **261** (TB.), **104**, **269** (coliform organisms), **258**, **260**, **268** (salmonella), **235** (ringworm), **67** (*Coccidioides* polysaccharide).

DISEASES CAUSED BY PROTOZOAN PARASITES

MORGAN, B. B. (1943). **Inoculations of *Trichomonas foetus* (Protozoa) in Guinea Pigs.**—*Proc. helminth. Soc. Wash.* **10.** 26–29. **31**

No ill effects were produced in 24 g. pigs injected intraperitoneally with 5 or 10 ml. of a saline suspension of washed living *T. foetus*; the average maximum time that living trichomonads could be recovered from the peritoneal cavities was 12 hours.

Of 20 g. pigs injected intraperitoneally with 5 or 10 ml. of the liquid portion of 72-hour cultures of *T. foetus* in buffered saline citrate with 5% bovine serum, two became ill; one died on the 11th day, and the second was killed on the 15th day. *T. foetus* was recovered from the peritoneal cavities of both, but *T. foetus* was not found during 25 days' observation on the remaining 18 animals.

Of 18 g. pigs inoculated intraperitoneally with bacteria-free trichomonad pyometra material, one yielded trichomonads from its abdominal cavity for five days.

Twenty g. pigs failed to become infected when inoculated subcutaneously with suspensions of washed living trichomonads or with fluid cultures. Thirteen g. pigs developed abscesses after subcutaneous inoculations of bacteria-free trichomonad pyometra material.

Of 30 non-pregnant g. pigs inoculated intravaginally with washed trichomonads, fluid cultures of trichomonads, or trichomonad pyometra material, only two showed living trichomonads for five days after inoculation. Both had received trichomonad pyometra material.—J. G. MURRAY.

GELORMINI, N. (1942). Experiencias con Trichomonas fetus. [**Research on** *T. foetus*].—*J. agron. vet., Univ. B. Aires, 1941.* pp. 429–443. **32**

T. foetus infection was found in 429 (8%) of 5,231 cows in the abattoir at Buenos Aires, and the organism was cultivated in chick embryos.

It was found impossible to reinfect a cow which had made a spontaneous recovery from experimental trichomoniasis, and three others which resisted reinfection calved quite normally.—MILLER WATSON.

MENON, K. P., AYYAR, P. V. S., & SHORTT, H. E. (1942). **Studies on Plasmodium gallinaceum.**—*Rep. King Inst. prev. Med., 1940–41.* pp. 29–34. **33**

BRUMPT described a plasmodium from domestic fowls in Asia, to which he gave the name of *P. gallinaceum.* The parasite is not common in Southern India, but is not infrequently found in domestic fowls in Ceylon. The present authors attach significance to the fact that where infections occurred in domestic fowls, the wild jungle fowl, the original progenitor of the domestic stock, was found in the adjacent jungles. Some 40 jungle fowl (*Gallus sonneratii*) were examined and one showed a plasmodial infection. The parasite was similar in morphology and exo-erythrocytic forms in brain and organs to parasites obtained from Ceylon, and also in cross-immunity and cross-agglutination tests. Exo-erythrocytic forms were found in small numbers on the fifth day of the incubation period, and it is considered that more intensive search might reveal still earlier stages of the parasite during the incubation period of the infection. In attempts at serial transmissions by the incubation-period stages of *P. gallinaceum,* an initial bird was injected with sporozoites and it was found that blood infection could be produced by serial inoculation of brain material containing the incubation-period stages as early as the fourth day, during the period of blood sterility. Prolonged exposure to superficial and deep X-rays had no inactivating effect either on the sporozoite in the mosquito or the erythrocytic stage in the blood. In experiments on the photodynamic action of methylene blue, when equal parts of citrated blood with erythrocytic forms and a 1 : 50,000 watery solution of methylene blue were exposed for 5 min. to bright sunlight the parasites were completely inactivated, as was shown by subsequent inoculation into chickens of the blood + methylene blue mixture. Investigation along other lines showed that the earliest day on which parasites can be demonstrated in the blood of chickens is the seventh day following sporozoite inoculation. Sporozoites remained viable and infective after 1½ hours in 0·85% normal saline or 2% citrated saline. Sporozoites from *Aëdes aegypti* were inoculated into the pectoral muscles of chickens, the position of inoculation being marked. After 18 hours the tissue into which the sporozoites were inoculated was removed, emulsified, and injected into fresh birds, which did not become infected, thus showing that the inoculated sporozoites had already migrated from the site of inoculation. The authors did not succeed in infecting chickens by dropping sporozoites on to scarified skin. Attempted infection of geckos and toads failed.—C. H. S.

RUSSELL, P. F., MOHAN, B. N., & PUTNAM, P. (1943). **Some Observations on Spleen Volume in Domestic Fowls in the Course of** *Plasmodium gallinaceum* **Studies.**—*J. Parasit.* **29.** 208–216. **34**

The lymphoid-macrophage system is an important factor in the resistance of an animal to malaria, and the spleen, a large element in this system, has to be considered when the physical or chemical basis of protozoan immunity is reviewed. The spleen volume in the non-malarious fowls used (these were approximately ten weeks old with an average weight of 634 g.) averaged 0·88 c.c. The regression of spleen volume in terms of weight of fowl was computed for each bird in the experimental groups and comparisons were made between observed and theoretical spleen volumes so that the effects of treatment could be assessed. The spleen of normal birds vaccinated with inactivated sporozoites increased in volume. A similar increase was observed when sera from normal sheep or from fowls chronically infected with the homologous plasmodium were injected. Sections showed that the increase in volume was connected with increase in lymphoid tissue, with enlarged sinuses engorged with lymphoid cells. The volume of the spleen was increased by malaria infection and there was no significant difference in the results obtained in blood-inoculated and mosquito-infected groups. The volume decreased as the chronic infection proceeded. The greatest increase in volume was observed in chronically malarious fowls which had received both vaccination and serum treatment following mosquito-borne infection.—C. HORTON SMITH.

PERRIN, T. L., BRIGHAM, G. D., & PICKENS, E. G. (1943). **Toxoplasmosis in Wild Rats.**—*J. infect. Dis.* **72.** 91–96. **35**

A complicating infection, believed to be toxoplasmosis, was encountered in g. pigs inoculated with brain material from wild rats trapped in Savannah, Georgia, during the course of an experimental typhus study. The gross P.M. findings were similar to those described by previous authors in g. pigs with toxoplasm infections, and typical crescentic forms were demonstrated in smears of peritoneal or pleural exudate. The infection was passed serially through a number of other laboratory animals, in which lesions typical of toxoplasmosis were produced. Histological examinations were made of one-half of 30 rat brains, the other half being inoculated into g. pigs. Toxoplasms were observed in seven of ten brains which produced toxoplasmosis in the inoculated g. pigs ; none were found in ten brains producing typhus fever on g. pig inoculation, nor in ten that failed to produce infection in g. pigs. It was estimated that 8·7% of wild rats in the district were affected with toxoplasmosis. The authors suggest the need of a further study of the incidence in wild rodents, since they may act as a source of human infection.

—M. L. BINGHAM.

TEIXEIRA, J. O. (1943). A "Nuttallia Equi" em Portugal. [*Babesia equi* **Infection in Portugal**].—*Rev. Med. vet., Lisboa.* **38.** 27–29. **36**

T. reports the occurrence of *B. equi* infection in a horse in Portugal.—MILLER WATSON.

*HASHIZUME, K., & KAMOTO, K. (1940). [**Rabbit Syphilis**].—*Bull. imp. Zootech. Exp. Sta.* [*Tiba-si*]. **39.** 1–26. [In Japanese]. [Abst. in *Biol. Abstrs.* **16.** 192, amended]. **37**

The average measurements of 1,100 rabbit spirochaetes stained by Fontana's silver method were :– length, 8–11μ ; diameter, 0·2μ ; 8–11 coils 1μ apart. The site of infection becomes swollen and congested 20–30 days after infection (at which time the organism may be demonstrated) and may ulcerate, later healing

spontaneously or persisting for months or even years. The infection remains local without rise of body temperature, nutritional disturbance, or lymphatic swelling. Rabbits were 100% susceptible to infection by implantation of infected tissue in the perineal region. 36·3% of infected females became pregnant, and 8·8% of their offspring survived longer than ten weeks. Arsenic-containing drugs such as neosalvarsan killed the spirochaete within two days and symptoms disappeared in 10–15 days. Tincture of iodine and mercury ointment were also effective.

GARDNER, A. D. (1943). **Dogs as a Source of Leptospiral Infection in Man.**—*Lancet.* **245.** 157–158. **38**

It is suggested that strong indications exist that infection occurs in dogs in Great Britain with a leptospira which is serologically distinct from *L. icterohaemorrhagiae, L. canicola,* and " other types known in Western Europe ", and which is transmissible to man. Cross-agglutination tests were carried out with cultures of four known leptospira and of two other strains, one of which was originally isolated from a spaniel while the other, " McIntyre ", was recovered from a research worker, who became infected while working on canine leptospirosis. The results are as shown in the table.

L. sejroe was not available at the time when the tests were carried out. Strains 5260 and " McIntyre " are therefore held to represent a hitherto unrecognized canine type, and a search was made for further human cases due to this type. Among 430 human sera received for aggln. tests for Weil's disease, one only—from a farmer—gave a positive reaction with strain 5260, and it was shown to agglutinate strain " McIntyre " to the same titre. The positive reaction developed between the sixth and 15th days of illness. The sera were all from jaundiced cases, and it is pointed out that in leptospirosis in man, jaundice is rare except in Weil's disease, in which it occurs in about 60% of cases.

—ALASTAIR N. WORDEN.

SAVINO, E., & ANCHEZAR, B. (1942). Presencia de leptospiras en las ratas grises en Buenos Aires. **[Leptospira in Rats in Buenos Aires].**—*Rev. Inst. Bact., B. Aires.* **11.** 135–138. **39**

The authors found leptospira in the kidneys of 16 (12·5%) of 142 rats caught in the harbours of Buenos Aires. *R. alexandrinus* was found to be infected only when this species inhabited the same area as *R. norvegicus. R. rattus* was not found infected.—M. WATSON.

See also absts. **236–238** (trypanosomiasis), **239** (coccidiosis), **240** (duck malaria).

Sera (rabbit)		Formolized serum-water suspensions					
		A	*B*	*C*	*D*	*E*	*F*
A.	*L. icterohaemorrhagiae,* Jackson ...	2,500	100	100	0	0	...
B.	*L. canicola,* Roesch	320	1,280	320	0	0	...
C.	*L. grippotyphosa*	200	80	1,280	20	0	...
D.	*L. bataviae*	80	200	50	5,120	0	...
E.	*L.* 5260 (spaniel)	0	0	20	0	2,500	...
F.	*L.* " *McIntyre* "	0	...	...	...	2,000	2,000

DISEASES CAUSED BY VIRUSES AND RICKETTSIA

RAMON, G., LEMÉTAYER, E., & MINGUET, P. (1942). De la production, chez le cheval, d'un sérum doué de propriétés neutralisantes et préventives à l'égard du virus de la fièvre aphteuse. **[Production of Foot and Mouth Disease Antiserum in the Horse].**—*C. R. Acad. Sci., Paris.* **215.** 479–480. **40**

The supernatant of a suspension of infected g. pig pads was used to inoculate two horses. One horse received a quantity of active virus corresponding to 20 g. and 25 g. of pads respectively at an interval of three weeks. The inocula also contained 2% of tapioca, calcium chloride, and alum. The other horse received virus inactivated by exposure to 0·75% formalin for 48 hours at a temperature of 34° or 26°C. The same substances were added to the inocula which were given in three doses corresponding to 20, 30, and 50 g. of guinea pig pads, at three-weekly intervals.

Subsequent *in vitro* neutralization and *in vivo* protection tests, the full details of which are not given, indicated that the equine serum prepared by both methods was as efficient as hyperimmune bovine serum.

—JOHN FRANCIS.

PYL, G. (1942). Ueber Frostschäden der Riemser Vakzine zur aktiven Immunisierung gegen Maul- und Klauenseuche. **[Frost Damage to Riems Foot and Mouth Disease Vaccine].**—*Berl. Münch. tierärztl. Wschr.* Oct. 30th. 321–322. **41**

P. describes two rapid tests to show whether the antigenic value of Riems F. & M. disease vaccine, which has become frozen in transit, is damaged for immunization purposes or not. The first test is for denaturation of the aluminium hydroxide gel and the second (more rapid) one for the demonstration of ice crystals in the vaccine bottle.

Vaccine in the earliest stage of freezing (appearance of the first few ice crystals in the bottle) is still effective, but vaccine more or less completely frozen is devoid of value for immunization.—J. E.

FERREIRA, J. (1942). A sensibilidade dos gatos às vacinas anti-rábicas. **[Sensitivity of Cats to Anti-rabic Vaccines].**—*Rev. Med. vet., Lisboa.* **37.** 191–193. **42**

It was found that cats could tolerate fairly large doses of antirabic vaccine, whether phenolized or formolized, without any apparent disturbance of health.

—ISOBEL W. BURTON.

BERNKOPF, H., & NACHTIGAL, D. (1943). **Complement Fixation Test with Sera of Animals Immunized with Rabies Virus.**—*Proc. Soc. exp. Biol., N.Y.* **53.** 36–38. **43**

The authors describe a simplified, effective procedure and give the comparative results of their experiments with both " street " and fixed viruses. Antirabies immune sera gave specific results and failed to react with brain antigens of animals infected with typhus or equine encephalitis or of normal brains. Partial decomposition of the brain did not interfere with the carrying out of the test and the highest titre was always obtained with the medulla as compared with other parts of the brain.—N. S. BARRON.

*Remlinger, P., & Bailly, J. (1941). Nécessité d'un traitement antirabique intensif des animaux mordus à la tête. **[Necessity for Intensive Antirabic Treatment for Animals Bitten in the Head].**—*Maroc. méd.* July. 129. [Abst. from abst. in *Bull. Inst. Pasteur.* **40.** 172]. **44**

There is discussion on the dosage of vaccine to be used when this method of dealing with animals which have been bitten is adopted. For bovine and equine animals which have been bitten in the head, at least 30 doses of 20 ml. of phenol vaccine should be given (three doses each morning and night for five days); for dogs, sheep, goats, and pigs similarly bitten, treatment should consist of at least 12 doses of 20 ml., two doses being given in the morning and four [? two] at night for three days.

Parker, L. L., & Peppe, V. J. (1943). **A Pox-Like Disease in a Dairy Herd.**—*Cornell Vet.* **33.** 104–105. **45**

An outbreak of a peculiarly obstinate and recurrent pox-like condition, in which the udder but not the teats were affected, occurred in a herd which the previous year had been affected by true cow pox. Attacks of this atypical pox-like disease did not confer any immunity.

Following ineffective treatment by sulfathiazole ointment, all cows were vaccinated with a "small-pox" vaccine. Local swellings were appreciable, but there was no systemic reaction and the disease died down in three weeks, although pustules appeared very occasionally during the subsequent three months.—N. S. B.

Maurer, F. D., & Jones, T. C. (1943). **The Blood Picture in Equine Influenza.**—*Amer. J. vet. Res.* **4.** 257–264. **46**

The authors studied red blood cell, leucocyte, and differential counts in 37 army horses with equine influenza. The cases could be divided into two main groups. (1) Cases uncomplicated clinically with secondary bacterial infection. These cases have one period of abnormally high temperature which persists for several days, and then return to normal. The leucocyte count which is normal at first as the temperature rises, increases later to a leucocytosis before the temperature falls. There is an absolute and relative neutrophilia. (2) Cases in which the primary virus infection is followed by secondary bacterial infection. These cases have a diphasic temperature curve, with the highest peak of neutrophilia at the time of the secondary febrile reaction. In convalescence there is an increase of monocytes and lymphocytes in all types of cases.

[This article shows the close correlation between haematological and clinical signs in certain types of disease.]—D. L. Hughes.

Davison, R. O. (1942). **Encephalomyelitis in Saskatchewan, 1941. (Preliminary report).**—*Canad. publ. Hlth J.* **33.** 388–398. **47**

The report deals with 543 human cases of equine encephalomyelitis with 44 deaths, and includes five tables and two figures. One table shows the progress of the disease from the onset in May to the last reported case in November, and indicates that the peak of the outbreak was reached during the last two weeks of August. Three tables show morbidity and mortality incidence, according to age and sex. The fifth table deals with age and sex incidence of the disease in hospitalized cases. The figures show the distribution of cases for the Province as a whole and in the cities respectively. A comparison of 108 cases treated with serum from immunized horses with 46 untreated cases revealed no marked differences in results. Increased cell counts and globulin content were found in 158 samples of spinal fluid examined. In about half the samples, blood counts were also increased. "Cuffing" around blood vessels and areas of degeneration or necrosis were noted in histopathological examination of 12 brains and spinal cords. The white matter of the pons and medulla was affected more than the cortex.

Included in the report also are the results of investigations by J. S. Fulton, Veterinary Pathologist at the University of Saskatoon. He reports unsuccessful attempts to isolate virus in over 150 blood samples from infected cases from which the blood was collected at an early stage of illness, this test being used because of difficulty in obtaining brain material. He describes also neutralization tests with convalescent serum, isolation of virus from two of nine brains examined, and the preparation of high-titred (by *in vitro* tests) neutralizing serum from horses.—L. M. Heath.

Carneiro, V. (1942). **Equine Encephalomyelitis in Brazil.**—*Proc. 6th Pacific Sci. Congr., 1939.* **5.** 251–258. **48**

Precise data concerning the occurrence of E.E. in Brazil are lacking, and the information contained in this paper is limited to an outbreak in the São Paulo district in 1937. Material was examined from six clinical cases; virus was isolated from one of these. There is no evidence of the disease having occurred in human beings.—J. C. Buxton.

Polson, A. (1941). **The Particle Size of African Horsesickness Virus as Determined by Ultrafiltration and Ultracentrifugation.**—*Onderstepoort J. vet. Sci.* **16.** 33–50. **49**

From data collected from the ultrafiltration, through Elford's graded collodion filters, of six strains of different antigenic structure, it was found that the limiting membrane, *i.e.* the membrane which just lets the virus through, is one with a porosity of $100\mu\mu$. Applying Elford's factor for the relation of the pore diameter to the end-point porosity, P. calculated that the diameter of neurotropic horse-sickness virus is $100 \times 0{\cdot}4$ to $0{\cdot}6 = 40$ to $60\mu\mu$, with a mean of $50\mu\mu$. By ultracentrifugation determinations using Elford's inverted capillary method, a mean diameter of $45{\cdot}4\mu\mu$ and a density of 1·25 g. per ml. for the six strains were obtained.

—E. M. Robinson.

Polson, A. (1941). **The Electrophoresis of the Neurotropic Virus of Horsesickness and its Neutralizing Antibodies in Low Concentration.**—*Onderstepoort J. vet. Sci.* **16.** 51–66. **50**

By means of a modified form of the moving boundary method of electrophoresis of Tiselius, the mobilities and iso-electric points of three antigenically different strains of horse-sickness virus were measured. It was found that all three strains have the same mobility and iso-electric points as serum albumin. This observation suggests either that serum albumin is adsorbed on to the surface of the virus or that the virus and serum albumin have the same chemical composition. The mobilities and iso-electric points of antibodies to two different strains of horse sickness were determined. Their iso-electric points were both at pH 5·4 and their mobilities were slightly less than that of the β-globulin of Tiselius.

Unsuccessful attempts were made by means of electrophoresis to separate active virus from neutral virus-antibody mixtures.—E. M. Robinson.

Casals, J., Webster, L. T. (1943). **Close Relation between Russian Spring-Summer Encephalitis and Louping-Ill Viruses.**—*Science.* **97.** 246–248. **51**

The authors carried out complement-fixation and cross-immunity tests, the results of which showed that

there was a close relationship between the viruses of Russian spring-summer encephalitis [see *V. B.* **12.** 498.] and louping-ill, cross-fixation being obtained to even titres. The other neurotropic viruses which were tested against the Russian virus were those of St. Louis encephalitis, Western equine encephalomyelitis, and Japanese B encephalitis. It is suggested that Russian spring-summer encephalitis and louping-ill may be caused by the same infective agent.—J. C. B.

FINDLAY, G. M., & COCKBURN, T. A. (1943). **Possible Role of Birds in the Maintenance of Yellow Fever in West Africa.** [Correspondence].—*Nature, Lond.* **152.** 245. **52**

Viricidal bodies against the yellow fever virus have been found in the blood of monkeys, cattle, sheep, dogs, pigs, and a camel. There is highly suggestive evidence that monkeys may act as an alternative host to man in maintaining yellow fever in Africa, but the monkey population is not large. The significance of viricidal bodies in the domestic animals is uncertain as these bodies have been found in animals living outside the commonly accepted yellow fever zone.

In order to explain the maintenance of yellow fever virus in certain areas, the sera of a number of wild animals and birds were examined. The most significant result was the demonstration of antibodies in the sera of four out of 40 birds examined. The positive birds were a buff-backed heron, *Bubulcus ibis ibis*, one of four examined, an African barn-owl, *Tyto alba affinis*, one of three examined, and a Senegal kingfisher, *Halcyon senegalensis senegalensis*, the only specimen examined. All these birds belong to common and widely distributed species.

Further work is proceeding to determine the exact significance of these antibodies ; it is pointed out that, in America, birds appear to play an important part in the maintenance of the Eastern and Western strains of equine encephalomyelitis virus : the same may be true of the yellow fever virus in Africa.—JOHN FRANCIS.

See also absts. **90** (rabbit papilloma virus protein), **105** (calf pneumonia), **241** (influenza).

IMMUNITY

COULSON, E. J., SPIES, J. R., & STEVENS, H. (1941 & 43). **The Immunochemistry of Allergens. I. Anaphylactogenic Properties of a Proteic Component of Cottonseed. II. Antigenic Studies by the Dale Method of the Electrophoretic Fractionation Products of the Protein-Carbohydrate Fraction, CS-1A, from Cottonseed.**—*J. Immunol.* **41.** 375–381, and **46.** 347–365. **53**

COULSON, E. J., & SPIES, J. R. (1943). **The Immunochemistry of Allergens. III. Anaphylactogenic Potency of the Electrophoretic Fractionation Products of CS-1A from Cottonseed. IV. Effect of Dilute Acid on Anaphylactogenic Activity, Specificity, and Reagin-Neutralization Capacity of Cottonseed Allergenic Fractions.**—*J. Immunol.* **46.** 367–376 & 377–389. **54**

I. The anaphylactogenic properties of the following substances were tested on g. pigs :– (1) a protein-carbohydrate fraction (CS–1) isolated from cottonseed, (2) a carbohydrate-free protein-picrate (CS–5) obtained from CS–1 by precipitation with picric acid, and (3) a picrate-free protein (CS–13) recovered from CS–5 by precipitation with 80% alcohol. All three fractions were found to cross-react with each other and with an unfractionated extract of cottonseed, the general conclusion being that the heat-stable protein CS–13 represents the allergenic component of cottonseed.

II. The antigenic relationships of electrophoretic fractionation products of CS–1 [designated CS–1A in this paper] were studied by the Dale method. The results obtained on testing the carbohydrate, protein-carbohydrate, and carbohydrate-free protein which were isolated suggested that the carbohydrate was not essential for establishing allergenic or antigenic specificity.

III. Data collected in estimating the anaphylactogenic activity and shocking capacity of the above-mentioned cottonseed fractions and of crystalline ovalbumen were used to construct dosage-response curves. On the basis of nitrogen content, the shocking capacity of ovalbumen and of all the cottonseed fractions was relatively similar. Their sensitizing potencies, however, exhibited large differences. Thus, on a nitrogen basis, the sensitizing capacity of cottonseed protein fractions containing a large amount of carbohydrate was as much as eight times greater than that of protein fractions containing small amounts of carbohydrate. The authors, therefore, conclude that, while the carbohydrate does not contribute to the specificity of the fractions, it does enhance their sensitizing activity.

IV. The effect of boiling N/10 HCl on the antigenic properties and reagin-neutralization capacity of the cottonseed fractions was investigated. Previous tests had indicated that, as far as their ability to elicit cutaneous reactions in cottonseed-sensitive human patients was concerned, the activity of these acid-treated fractions was unaltered [SPIES *et al.* (1941). *J. Amer. chem. Soc.* **63.** 2163]. The results obtained indicated that estimations of the effect of the acid treatment on the activity of the fractions depended on the test-method employed. On the basis of nitrogen content, the shocking capacity of the treated fractions was reduced by 54–66% while their ability to induce sensitization was lessened by 78–97%. Similarly, the " in vitro " reagin-neutralization potency of the acid-treated carbohydrate-free protein fraction was diminished by more than 95%, yet its activity in eliciting specific cutaneous reactions in allergic human beings was not apparently altered. Accordingly, it appears that the antigenic structural features required to sensitize are not identical with those required to shock, and that the structural characteristics required to elicit cutaneous reactions in sensitive individuals are different from those required to neutralize reagins.—J. LOCHIEL MCGIRR.

I. CORPER, H. J., & CLARK, C. (1942). **Congenital Tuberculin Hypersensitiveness and Specific Tuberculo-Allergic Immunity.**—*Amer. Rev. Tuberc.* **46.** 309–318. [Spanish summary]. **55**

II. CORPER, H. J., & COHN, M. L. (1943). **Congenital Tuberculosis. Tuberculosis Studies in Offspring of Mother Guinea Pigs Heavily Infected Intravenously.** —*Ibid.* **48.** 25–31. [Spanish summary]. **56**

III. ANDERSON, R. J., REEVES, R. E., CREIGHTON, M. M., & LOTHROP, W. C. (1943). **The Chemistry of the Lipids of Tubercle Bacilli. LXV. An Investigation of Tuberculous Lung Tissue.**—*Ibid.* 65–75. [Spanish summary]. [For previous parts, see *V. B.* **12.** 73]. **57**

I. The following group of experiments was undertaken in an attempt to determine whether, and under what conditions, tuberculo-anaphylactic and tuberculo-allergic hypersensitiveness would pass from mother to offspring.

(a) An anaphylactic hypersensitive state was produced in female g. pigs by the intravenous injection of raw culture filtrate of a human type tubercle bacillus in

doses containing 10 mg. tuberculo-protein. The anaphylactic hypersensitivity was found to be regularly transferred to offspring born during a year or more after sensitization of the mother, immediate death from acute anaphylactic shock being produced in the young by the intravenous injection of 1–3 mg. tuberculo-protein up to at least three months after birth. No anaphylactic state was produced in offspring of tuberculous mothers or of mothers inoculated subcutaneously with avirulent bacilli: when, however, a large amount of bacillary suspension (20 mg. bacilli) was injected, the amount of tuberculo-protein present was sufficient to sensitize anaphylactically.

(b) An allergic hypersensitive state was produced in female g. pigs by the subcutaneous injection of 0·000,001 mg. of a highly virulent human type bacillus (strain H-160). All the female g. pigs died with generalized TB. 4–6 months after injection, but allergic hypersensitivity was not transferred to offspring born 1–3 months after infection of the mother, and young 1–3 months of age did not react to intravenous doses of 2·7 mg. tuberculo-protein.

(c) Female g. pigs, sensitized allergically by the subcutaneous injection of 1 mg. of avirulent human bacilli, were desensitized by 33 subcutaneous injections of culture filtrate, the injections being spaced at intervals of 6–10 days to avoid anaphylactic shock. Offspring born of these animals were given an allergic sensitizing dose of 1 mg. of avirulent bacilli and, one month later, were tested by the subcutaneous injection of filtrate containing 3 mg. tuberculo-protein. Of the 27 offspring tested, 26 died in allergic intoxication within three days of the test injection, a result which is held to indicate that the tuberculo-protein desensitization of the mother was not transferred to the young.

It is suggested that these results support the concept that tuberculo-anaphylaxis and tuberculo-allergy are two separate biological phenomena, and that they indicate that biologically reactive tuberculo-protein is not present as such in the tubercle bacillus or liberated by bacilli in the animal body. [See also III.]

II. In view of the foregoing result, which would appear to render unlikely the passage of tubercle bacilli from mother to offspring *in utero* under ordinary circumstances (since the passage of as little as 0·000,001 mg. of bacilli would produce tuberculo-allergic sensitization), the possibility was investigated of the passage of virulent human type tubercle bacilli from heavily infected mother g. pigs to offspring. Pregnant animals were given an intravenous injection of 0·01 mg. of virulent organisms (strain H–160) 1–12 days before parturition and the young were studied at intervals after birth by submitting them to tests for the presence of tuberculo-allergic hypersensitiveness or for specific tuberculo-immunity. All carcasses were submitted to bacteriological examination.

In spite of the fact that the mother g. pigs succumbed to the infection 1–2 weeks after parturition, passage of the infection to the young occurred in only one of the 19 offspring examined. (This infected animal, the only one in the litter, is regarded by the authors more or less as "the exception which proves the rule"). Of a further 13 offspring examined for signs of immuno-allergy at ages ranging from 33–77 days, not one exhibited any discernible specific tuberculo-immunity as determined by infection tests or any tuberculo-allergic hypersensitiveness as determined by intradermal tuberculin tests.

III. Thorough examination of tuberculous human lung tissue failed to detect even traces of the specific substances phthiocol, tuberculostearic acid, phthioic acid, and specific polysaccharide which occur in the human type tubercle bacillus when it is grown on a synthetic medium, though they could be easily isolated and identified when traces were incorporated in normal human lung tissue. The authors conclude that either the specific chemical bacillary products are not present in sufficient amounts for chemical detection or that tubercle bacilli growing in living tissue do not produce the same characteristic chemical compounds that are found on bacilli cultivated on artificial media. [See also I & II.]—J. Lochiel McGirr.

*Delaunay, A. (1940–41). Recherche sur la phagocytose. [**Research on Phagocytosis**].—*Rev. Immunol.* **6.** 307. [Abst. from abst. in *Zbl. Bakt. I.* (*Ref.*) **142.** 125]. **58**

Staphylococci were grown on agar and subsequently autolysed at 37°C. in the presence of toluol. Centrifugation and filtration gave a lemon-yellow fluid containing a moderate amount of protein and this was injected in doses of 0·25–0·5 ml. into the shaved abdominal skin of g. pigs. Histological examination of the skin at intervals showed vascular dilatation and perivascular accumulation of leucocytes as early as two hours after injection; emigration of leucocytes was very intense at the end of five hours. Sterile abscesses sometimes resulted. The reaction had usually subsided at the end of 36 hours. Heating at 100°C. for 30 min. did not affect the potency of the material. Further study of the autolysate showed that the chemotactic principle was the staphylococcal polysaccharide and when purified this substance was chemotactic in doses as low as 1/10,000 mg. It is suggested that the pus-producing ability of staphylococci in the body may be due to liberation of polysaccharide when the organisms undergo autolysis. A study of the chemotactic properties of other carbohydrates showed that polysaccharides are much more active than monosaccharides or disaccharides.—E. G. White.

I. Findlay, G. M., & Martin, N. H. (1943). **Jaundice Following Yellow-Fever Immunisation. Transmission by Intranasal Instillation.**—*Lancet.* **244.** 678–680. **59**

II. Anon. (1943). **Infective Hepatitis and Serum Jaundice.**—*Ibid.* 683–684. **60**

I. A recurrence during recent months of the post-inoculation jaundice (P.I.J.) problem [see *V. B.* **13.** 389, absts. 2619–2621] has provided the opportunity for further transmission experiments. The cases occurred following yellow-fever immunization, and the symptoms are said to have been identical with those previously described. Full clinical details are to be published later.

All attempts to transmit the disease to animals (cercopithecus, cercocebus, and colobus monkeys, baboons, horses, and laboratory rodents) were unsuccessful, but human passage was apparently successful. Nasal washings were taken from patients in the pre-icteric or early icteric stages of P.I.J., and were instilled into the nares of four adult male volunteers, who had no prehistory of jaundice and who had been immunized against yellow-fever with vaccine from a batch not associated with P.I.J. In three cases, symptoms similar to those of infective hepatitis developed in 28, 30, and 50 days respectively.

The presence of the infective icterogenic agent in the nasopharynx of cases of P.I.J., together with other available data, is accepted as evidence that a virus, rather than some hypothetical toxin, is the most probable cause.

II. The findings in I are discussed, with reference to earlier work on infective hepatitis or catarrhal jaundice and on P.I.J. It is stated that the hepatitis

developing after inoculation is clinically indistinguishable from catarrhal jaundice, while both conditions may be related to the jaundice which often develops in patients undergoing treatment with arsenical preparations. The fact remains, however, that P.I.J. has a much longer incubation period than has catarrhal jaundice.

The three following possibilities are put forward :– (a) that the three conditions (P.I.J., catarrhal jaundice and arsenical hepatitis) are caused by infection with the same virus ; (b) that, as in the case of influenza viruses A and B, there are different agents which produce the same clinical picture but are not mutually protective ; (c) that there are different strains of the same virus, antigenically related but not conferring complete protection against each other. In (c) therefore, breakdown might follow if resistance were lowered through deficiency of an essential cell metabolite, or injection of a toxin. It remains to be proved that the conditions under consideration are, in fact, all caused by a virus. Attention is drawn to the fact that a team of Medical Research Council workers is now engaged in a study of some of the relevant problems.—Alastair N. Worden.

*Lemétayer, E. (1940–41). Rôle des leucocytes dans la production des antitoxines. **[Role of Leucocytes in the Production of Antitoxins].**—*Rev. Immunol.* **6.** 322. [Abst. from abst. in *Zbl. Bakt. I.* (*Ref.*). **142.** 116]. **61**

In 1931, Soituz found that the leucocytosis which follows the injection of tapioca together with antigens was maximal when the antibody titre reached its peak. S. used only a small number of horses for his experiments and L. has repeated the work on a much larger scale. Horses were given increasing doses of anatoxin and toxin with or without addition of 1% tapioca. The former showed little or no local oedema and no rise of temperature. Animals given tapioca showed extensive local oedema and with large doses of antigen there was actual abscess formation. The local lesions were fully developed in 24–48 hours and subsided after a few days ; there was pyrexia and marked leucocytosis, especially with large doses of antigen. The antitoxin titre of animals receiving tapioca was 10–15 times that of the controls. Leucocytosis was present in both groups of animals, but was more pronounced in those receiving tapioca ; the highest leucocyte counts occurred on the day following the injection. The rise in antibody titre was sometimes slow and at other times rapid and it was not possible to correlate the rise with the leucocytosis. All the observations were made with diphtheria and tetanus antigens. Other nonspecific substances, such as calcium chloride, behaved like tapioca.

—E. G. White.

Barrett, M. K. (1941). **The Antigenic Nature of Purified Chicken Tumor Agent. Preliminary Report.** —*Cancer Res.* **1.** 543–544. **62**

Antigenic differences between purified extracts of chick embryo and chicken tumour have been observed. Antiserum prepared by the use of purified embryo extract does not neutralize the tumour agent *in vivo*, but fowl-specific and tumour-specific properties of tumour antiserum can be dissociated.—H. Laser.

Day, H. B. (1942). **Studies in Immunization by a Species Antigen. I. Preparation of Species Antigen from Pneumococci.**—*J. Hyg., Camb.* **42.** 532–546. **63**

Various methods of treatment of organisms from trypsinized serum broth cultures of pneumococci (types 1 and 2) were investigated with a view to producing an antigen for satisfactory species (as opposed to type-specific) immunization, mice being used as test animals.

The results obtained indicated that successful immunization against infections by heterologous pneumoccal types was dependent on the use of material (carbohydrate in nature, but distinct from the type-specific polysaccharide) derived from the cell substance of the cocci. It was found necessary to prepare this species antigen as free from protein as possible, since little or no protection was developed when any considerable amount of the latter was present in the immunizing material. Three different methods for the preparation of the antigen were found to be satisfactory:– (1) treatment of a saline suspension of the cocci with HCl at a concentration equivalent to N/30 at 60°C. for one hour, followed by removal of the bacterial débris by centrifugation, addition of sufficient N/10 NaOH to bring the pH to 9, and incubation at 37°C. for three hours ; (2) autolysis of alcohol-killed organisms suspended in saline for 11 days at 40°C., followed by heating in N/30 HCl and incubation at pH 9 ; (3) fractional disintegration of the organisms by the use of reagents such as Na taurocholate and formamide, followed by alcohol or acetone precipitation, and re-solution of the species antigen in alkaline saline (pH 9·0). Immunization of mice by antigen prepared by all three methods resulted in a considerable degree of protection against subsequent infection by virulent cocci of different types.

—J. Lochiel McGirr.

Pauling, L., Campbell, D. H., & Pressman, D. (1943). **The Nature of the Forces between Antigen and Antibody and of the Precipitation Reaction.**— *Physiol. Rev.* **23.** 203–219. **64**

The authors present a discussion of the subject from the point of view of modern physical and structural chemistry. Only the simpler aspects of the phenomena are reviewed, and complicating factors such as the part played by complement and lipids are disregarded.

After a brief historical introduction, the nature of the specific forces responsible for the attraction and combination of antigen and antibody is discussed. The attractive mechanisms are classified as electronic van der Waal's forces, electric dipoles and multipoles, hydrogen-bond formation etc. and the relationship of these weak and non-specific forces to the strong and specific attraction of antigen and antibody is discussed. It is emphasized that the only explanation of antigen-antibody interaction phenomena which present knowledge of molecular structure and intermolecular forces provides is that postulated in the " complementary-structure theory ". This hypothesis suggests that the surface of an antibody is complementary to that of its antigen and that non-specific intermolecular attractive forces are thus allowed to come into much fuller operation than would be possible for non-complementary structures [see Pauling—*V. B.* **12.** 30].

The question of the specificity or non-specificity of the secondary changes which lead to the precipitation of the initial antigen-antibody complex and the vexed problem of antibody valency are discussed in subsequent sections. The authors present evidence against the theories of Boyd [*V. B.* **13.** 54.] and other workers, and suggest that experimental findings favour the view that precipitation is produced by a continuation of the initial antigen-antibody interaction process to form an insoluble framework of antigen and antibody molecules. They believe that both antigen and antibody must be at least bivalent. [For the alternative view that antibody is univalent, see Hooker & Boyd—*V. B.* **13.** 214, and Haurowitz & Schwerin (below).]

The last portion of the review gives a brief account of the more recent quantitative theories of the precipitation reaction.—J. Lochiel McGirr.

HAUROWITZ, F., & SCHWERIN, P. (1943). **The Specificity of Antibodies to Antigens Containing Two Different Determinant Groups.**—*J. Immunol.* **47.** 111–119. **65**

In an attempt to elucidate the problem of antibody valency, rabbits were immunized with antigens containing two different determinant groups and the antibodies produced were separated and quantitatively determined by fractional precipitation of the immune sera [see HAUROWITZ—*V. B.* **13.** 213].

The results obtained were as follows. (1) Immune sera to the "complex" antigens arsanil-metanil-azo-globulin, metanil-arsanil-azo-globulin, arsanil azo-iodoglobulin, and iodo-arsanil-azo-globulin were precipitated by the "partial" antigens arsanil-azo-globulin, metanil-azo-globulin, iodo-globulin, and by arsanil-azo-ovalbumin and iodo-ovalbumin. (2) When immune sera to "complex" antigens were exhausted successively with "partial" antigens containing, singly, the determinants of the antibody-evoking antigen they did not produce any further precipitate with the homologous "complex" antigens. Conversely, immune sera precipitated by homologous "complex" antigens gave no further precipitate with the "partial" antigens. (3) Immune sera to mixtures of two "partial" antigens were quantitatively absorbed by "complex" antigens containing the two determinants from each of the antiserum-evoking "partial" antigens, as well as by absorption successively by the two "partial" antigens.

The authors conclude that immunization with a complex antigen containing two determinants, A and B, leads to the formation of two antibodies, anti-A and anti-B, and that, in their experiments, there is no evidence of the presence of anti-AB. These results, accordingly, are held to support the assumption that antibodies are univalent. [For views in support of antibody multivalency, see PAULING *et al.* (preceding abst.).]—J. LOCHIEL MCGIRR.

LOWELL, F. C. (1943). **A Comparison of the Collodion-Particle Technic with Other Methods of Measuring Antibody.**—*J. Immunol.* **46.** 177–182. **66**

The collodion-particle technique for the detection of antibody [see CANNON & MARSHALL—*V. B.* **11.** 380.] was compared with the gelatin-interface test of HANKS [(1935), *J. Immunol.* **28.** 95.] and with the complement-fixation test by determining the extent to which antisera of various strengths could be diluted without the loss of their ability to produce a visible antigen-antibody reaction. Rabbit antisera to ovalbumin, horse serum, and ragweed were used and antibody-nitrogen determinations were made for certain of the stronger sera.

The collodion-particle technique consistently permitted the greatest dilution of the antiserum without loss of a visible antigen-antibody reaction, and gave a reliable indication of the strength of the antiserum. Next in order of sensitivity came the gelatin-interface test.—J. LOCHIEL MCGIRR.

HASSID, W. Z., BAKER, E. E., & MCCREADY, R. M. (1943). **An Immunologically Active Polysaccharide Produced by *Coccidioides immitis* Rixford and Gilchrist.**—*J. biol. Chem.* **149.** 303–311. **67**

The preparation and properties are described of a polysaccharide produced by *Coccidioides immitis* when grown for two months at 37°C. on a modified Bureau of Animal Industry tuberculin medium. The culture filtrate was concentrated by ultrafiltration and the polysaccharide obtained by fractional precipitation of the free acid of the polysaccharide from alcohol. Investigation of the properties of the polysaccharide showed that the compound consisted of units of galacturonic acid, glucose, and an unidentified sugar present in the approximate ratio of 1 : 6 : 3 respectively. All tests for protein were negative, but a nitrogenous compound was found to be associated with the carbohydrate. The persistence of part of the nitrogen after acetylation and deactylation of the polysaccharide indicates that part of the nitrogen is not an impurity, but probably exists in organic combination with the carbohydrate.

Both the original culture filtrate and the alcohol-precipitated polysaccharide gave positive skin reactions in sensitive individuals, but the polysaccharide obtained by regeneration from the acetyl derivative was no longer active. All three preparations, however, gave positive precipitative reactions.—R. ALLCROFT.

See also absts. **9** (tuberculin test), **75** (Forssman antigen in *Trichinella*).

PARASITES IN RELATION TO DISEASE [ARTHROPODS]

PIRES, A. (1942). Alergía en el parasitismo con especial referencia a la intradermo-reacción en el diagnóstico de la Gastrofilosis equina. [**Allergy in Parasitism: Intradermal Test for *Gastrophilus* Infestation**].—*J. agron. vet., Univ. B. Aires, 1941.* pp. 279–315. **68**

P. used an antigen, consisting of a 0·5% suspension of dried *G. equi* material in saline, for an intradermal test for the diagnosis of *Gastrophilus* infestation. Infested animals showed a strong local reaction in 2–24 hours, the reaction only occurring in animals which proved P.M. to be infested.

Animals with strongyle infestation reacted to an intradermal test with an antigen similarly prepared from strongyle material.

The work is being pursued with a view to determining the exact degree of specificity of these tests.—M. W.

WATERSTON, J. (1942). **Fleas as a Menace to Man and Domestic Animals. Their Life-History, Habits and Control.** [Revised by JORDAN, K.]—*Brit. Mus.* (*Nat. Hist.*) *Econ. Ser.* No. 3. pp. 20. London: Trustees of the British Museum. [5th Edit.] [8vo] [4d.] **69**

An authoritative, non-technical account of fleas dealing with structure, life-history, habits, relations to disease, and methods of control.—J. B. CRAGG.

HEYMONS, R. (1942). Der Nasenwurm des Hundes (Linguatula serrata Froelich), seine Wirte und Beziehungen zur europäischen Tierwelt, seine Herkunft und praktische Bedeutung auf Grund unserer bisherigen Kenntnisse. [**Origin, Hosts, Relationships, and Practical Importance of *L. serrata* in European Animals**].—*Z. Parasitenk.* **12.** 607–638. **70**

This is a comprehensive review of the biology of *L. serrata.* The larval stage has been found in sheep, goats, cattle, buffaloes, dromedaries, deer, antelopes, pigs, horses, hares, rabbits, hedgehogs, porcupines, dormice, g. pigs, rats, and mice, and the mature parasite in dogs, wolves, foxes, horses, mules, sheep, goats, cattle, and human beings. An extensive bibliography is given.—J. B. CRAGG.

See also absts. **242–247** (insecticides), **79** (vectors of swine acanthocephala).

PARASITES IN RELATION TO DISEASE [HELMINTHS]

BACIGALUPO, J. (1942). Fasciola hepática L. Su ciclo evolutivo en la República Argentina. Distomatosis hepática. [**Life-Cycle of *F. hepatica* in the Argentine**]. —*An. Fac. Vet., Montevideo.* **4.** 9–134. **71**

The common intermediate host of *F. hepatica* in Argentina is *Limnaea viatrix*. The parasites may develop in young or old snails and may be situated in the foot as well as in the lung. B. was unable to observe the development of daughter rediae during the summer and on only one occasion in winter. Development of the miracidium in the mollusc to the stage of liberation of cercariae varied from 50–78 days. In experimental animals, the period between the ingestion of cercarial cysts and elimination of *F. hepatica* eggs varied from 54–90 days.

B. also studied specimens of *L. attenuata* sent from Mexico, and found that these could be infected only when very young. The paper is well illustrated.

—MILLER WATSON.

PRICE, E. W. (1943). **The Presence of the Lancet Fluke, Dicrocoelium dendriticum (Rudolphi, 1918) in Cattle in the United States.**—*Vet. Med.* **38.** 294–296. **72**

BAKER, D. W., & NELSON, S. K. (1943). *Dicrocoelium dentriticum* **Infections in N.Y. State Cattle.**—*Cornell Vet.* **33.** 250–256. **73**

Both papers give records of the discovery of *D. dendriticum* in New York State. The first report of the presence of the parasite in the U.S.A. was that of PRICE & KINCHELOW [(1941). *J. Parasit.* **27.** Suppl. p. 14.] and since then a total of 21 cases has been described. A description of the morphology of the fluke and an account of its life-history are given to serve as an aid to practitioners in diagnosis of the condition. The snail which serves as an intermediate host for the fluke in the U.S.A. has not yet been recognized.

—T. E. GIBSON.

CÁMPORI, A. S. (1942). Diagnóstico de las teniasis en el perro por el metodo del hisopo. [**Diagnosis of Taeniasis in Dogs by a Swab Method**].—*Rev. Fac. Agron. vet., B. Aires.* **9.** 170–180. [English and Portuguese summaries]. **74**

C. describes a modification of a swab method of diagnosis for taeniasis. A small gauze swab on a blunt forceps is dipped in pure glycerin, is then rubbed over the perineal region, and inserted into the rectum and twisted around. The swab is then rubbed on a slide and a drop of the glycerin is also squeezed on to it. The glycerin serves the double purpose of causing eggs to adhere to the swab and of clearing them for microscopic examination.

It is important that the dog should not be washed for at least one week before the examination is made.

—MILLER WATSON.

ROSE, H. M. (1943). **On the Occurrence of Forssman Antigen in *Trichinella spiralis*.**—*J. Immunol.* **47.** 53–57. **75**

R. failed to confirm the report of MAUSS [*V. B.* **12.** 420.], that *T. spiralis* contains Forssman heterogenetic antigen which in rabbits could induce the formation of a haemolysin for sheep erythrocytes.

Blood sera from 17 clinical cases of trichinosis were examined for sheep erythrocyte agglutinins and haemolysins, but all titres were found to be within normal limits. Rabbits artificially infected with *T. spiralis* also failed to reveal heterophile antibody. Rabbits injected with sheep erythrocytes and emulsion of g. pig kidney, did not develop precipitins for trichinella antigen.

—J. KEPPIE.

REES, G. (1942). **The Worm Burden of Sheep on Improved and Unimproved Hill Pastures.**—*J. Anim. Ecol.* **11.** 198–204. **76**

The worm burden, based on faecal egg counts, of sheep on an improved hill pasture, carrying four sheep per acre, was found to be considerably lower than that of animals on an adjacent unimproved pasture, carrying 1·6 sheep per acre, in the neighbourhood of Aberystwyth, Wales. All the animals wintered together for nearly five months on the same poor, wet lowland pasture where worm infestation was mainly acquired. In May, the sheep returned to their respective hill pastures where they remained until December. Those on the improved pasture showed infections, as measured in eggs per gramme of faeces, of 321, 134, and 204 in early July, late August, and early November, while animals on the unimproved pasture showed infections of 1,788, 225, and 875 at corresponding times. R. suggests that the difference in the degree of infestation may be due to the better health and greater resistance of the sheep on the good pasture, and to the better quality of the herbage which is not grazed as closely or as extensively. Attention is drawn to the absence of *Limnaea truncatula* from the well drained, improved pasture on which, naturally, no increase in fluke infestation takes place.—J. N. OLDHAM.

SARLES, M. P. (1943). **Overwinter Loss of Nodular Worm Larvae from a Sheep Pasture and its Bearing on the Control of Nodular Worm Disease.**—*J. Parasit.* **29.** 263–269. **77**

A 0·7-acre pasture at Beltsville, Maryland was grazed from May 10th to November 1st, 1940, by four sheep, which passed in their faeces during this time a calculated total of 89½ million eggs of *Oesophagostomum columbianum*. The pasture remained unoccupied for seven months from November 1st, 1940 to June 2nd, 1941, the weather during this period being fairly normal. At the end of the rest period an attempt was made to recover *Oesophagostomum* eggs and larvae from faecal pellets and soil taken from the pasture, but the results were negative. From June 2nd, 1941, two test lambs (free from intestinal parasites except coccidia and *Strongyloides*) were grazed on the pasture for two weeks and then removed to a special isolation cage. Faecal examinations when the lambs were removed from the pasture and three weeks later were negative for *Oesophagostomum* eggs and at P.M. examination 22 and 25 days respectively after removal from the pasture, the lambs were found to be free from *Oesophagostomum* and intestinal nodules. The *Oesophagostomum* eggs and larvae had therefore been killed during the winter. S. points out that the perpetuation of *Oesophagostomum* is due to the persistence of adult worms in the breeding stock, rather than to survival of larvae on the pastures. Control of *Oesophagostomum* could therefore be achieved by overwinter resting of pastures combined with anthelmintic treatment of breeding stock before they are returned to the pastures in spring.—T. E. GIBSON.

OLIVIER, L. (1943). **The Occurrence of *Syngamus trachea* in Mature Chickens.**—*Proc. helminth. Soc. Wash.* **10.** 87. **78**

The fact that adult fowls may harbour gapeworms [see also *V. B.* **12.** 40.] is confirmed. O. placed 13 chickens on ground contaminated with *S. trachea* and later found light infestations with gapeworm in six birds of one year or older, and a severe infestation in an 11-month-old bird. He suggests that adult fowls may be an important factor in maintaining and spreading infection.—M. L. BINGHAM.

KATES, K. C. (1943). **Development of the Swine Thorn-Headed Worm, Macracanthorhynchus Hirudinaceus, in its Intermediate Host.**—*Amer. J. vet. Res.* **4.** 173–181. **79**

K. has made a study of the development of *M. hirudinaceus* in the final instar grubs of *Colinus nitida* and several species of *Phyllophaga*. Infection was by feeding the eggs in faeces and soil. The terms "acanthor" and "acanthella" have been used to designate the two major stages of development, acanthor referring to the stages in which the embryonic structures predominate and acanthella to the stages in which the organ primordia develop into organs, and which are found in the body cavity of the intermediate host. For convenience, K. divides the acanthor into two stages and the acanthella into six and gives descriptions of these. The anatomical features and times of development of all the stages are summarized in a table, and drawings and photographs of all stages are given.

—T. E. GIBSON.

See also absts. **68** (horse strongyles), **248–250** (anthelmintics), **262** (trichinosis), **270** (isolation of parasites from tissues), **283** (index catalogue).

SPONTANEOUS AND TRANSMISSIBLE NEOPLASMS AND LEUCAEMIAS [INCLUDING FOWL PARALYSIS]

I. KENNAWAY, E. L. (1942). **A Contribution to the Mythology of Cancer Research.**—*Lancet.* **243.** 769–772. **80**

II. HUEPER, W. C. (1943). **Mythology of Cancer Research. A Reply to Professor Kennaway.**—*Ibid.* **244.** 538–540. **81**

III. KENNAWAY, E. L. (1943). **Mythology of Cancer Research. [Correspondence].**—*Ibid.* 599. **82**

I. In an adverse criticism of certain passages in W. C. HUEPER'S monograph [(1942). *Occupational Tumours and Allied Diseases*. pp. 896. Baltimore, Md.: Charles C. Thomas.], the three subjects of contention are essentially of veterinary interest, *viz*, arsenic cancer in horses, carcinoma of the nasal mucous membrane in sheep, and arsenic cancer in deer.

Against the validity of the account given by PARIS about 1820 of arsenic cancer in Cornwall, K. quotes an extensive criticism by BUTLIN [(1892). *Brit. med. J.* **1.** 1341, and **2.** 66]. He points out also that PARIS referred to arsenic cancer in cattle, not in horses.

The second disputed topic is the interpretation of NIEBERLE'S recent paper [*V. B.* **11.** 180.] on endemic cancer in the ethmoid bone of sheep. K. accuses HUEPER of completely distorting NIEBERLE'S cautious interpretation of his own data.

The third point concerns PRELL'S observations [*V. B.* **8.** 731.] on disease among wild game and bees in the neighbourhood of a foundry in Saxony, which, according to K., cannot possibly be construed as providing evidence that arsenic is carcinogenic.

II. A reply to I. One mistake in transcribing NIEBERLE'S account is admitted, but it is held that this does not invalidate the conclusions originally drawn, and H. emphasizes that NIEBERLE regarded the "arsenical aetiology" as the most likely one.

The discussion of PARIS'S account is largely taken up with a reiteration of statements concerning human cancer in Cornwall. In defence of the transcription of PRELL'S paper it is stated that a similar interpretation has been given in Germany.

III. A letter in which the evidence from NIEBERLE'S paper is dismissed on the grounds of HUEPER'S admitted error in transcription.—A. N. W.

HUEPER, W. C. (1942). **Morphological Aspects of Experimental Actinic and Arsenic Carcinomas in the Skin of Rats.**—*Cancer Res.* **2.** 551–559. **83**

A description is given of many varieties of tumour claimed to have been produced in rats. The types of "actinic carcinomas" include:– squamous-cell, with or without cornification; basal-cell; adamantinomatoid (one case only); pseudoglandular; "sebaceous carcinoma"; and anaplastic. Malignant change in the subcutaneous connective tissue was also noted in many cases. A single "arsenic carcinoma" is described: this developed as a nodular tumour in the subcutaneous tissue of the longest surviving member of ten rats which were dosed with increasing amounts of arsenious acid. The tumour, which is described as having a tricho-epitheliomatous structure, was noted after two months, and it is suggested that the latent period of experimental "arsenic carcinoma" is greater than the average life span of the rat.

SALTER, W. T., NATHANSON, I. T., & WILSON, H. (1941). **Experimentally Induced Benignancy of Neoplasm. V. The Influence of Hormones on the Host's Resistance to Implanted Neoplasm.**—*Cancer Res.* **1.** 60–64. **84**

The carcinogenic effect of estrogen, when administered parenterally, suggests that an excess of the hormone in the animal body may favour malignant growth. In this paper, however, it is shown that oestrone may also inhibit the growth of implanted tumours by enhancing a primary resistance mechanism, the fate of an implanted tumour is determined by the endocrinological status of the host.—H. LASER.

MILLER, E. W., ORR, J. W., & PYBUS, F. C. (1943). **The Effect of Oestrone on the Mouse Skeleton, with Particular Reference to the Newcastle Bone Tumour (NBT) Strain.**—*J. Path. Bact.* **55.** 137–150. **85**

In an inbred strain of mice, 67% of 337 females and 23% of 350 males over the age of six months showed spontaneous bone tumours. On the hypothesis that the sex difference in the incidence rate is due to some action of the female sex hormone, oestrone was administered either by painting twice weekly with a 0·02% solution in benzene or by subcutaneous implantation of a tablet weighing from 2–5 mg. Oestrone was also administered to three other inbred strains with low bone-tumour incidence. The results afforded no evidence as to whether tumour incidence is increased by oestrinization.—H. LASER.

SCHMAL. (1942). Ueber Adamantinome bei unseren Haustieren. **[Adamantinoma in Domestic Animals].**—*Arch. wiss. prakt. Tierheilk.* **78.** 56–79. **86**

S. discusses the origin of adamantinoma in man and in animals. In both it is a rare tumour, but while in man it is usually connected with the development of the wisdom teeth and shows predilection for the female, in animals it is usually found in early life and most often in the region of the incisor teeth. There seems to be no sex difference in incidence. It is most common in cattle, and usually found in the lower jaw. S. describes a case observed by him, which occurred in a two-year-old foal. A small lump on the lower jaw, present for several months, suddenly began to enlarge rapidly. Supernumerary teeth were seen in X-ray photographs. Removal by operation was attempted, but the growth rapidly recurred, and the animal had to be destroyed six weeks later.—J. G. CARR.

NEUBUERGER, K. T., & DAVIS, C. L. (1943). **Cerebral Tumour in a Dog Resembling Human Medulloblastoma.**—*Cancer Res.* **3.** 243–247. **87**

A large (3 × 2·5 × 2 cm.) funnel-shaped tumour, occupying most of the lateral ventricles, particularly the left, was found in the brain of a three-year-old male English bulldog which was destroyed after an illness of three months' duration. The initial symptoms were profuse sweating, nervousness, and heavy breathing while at rest, followed by periodic attacks of tetanic muscular spasms, and later by weakness, vomiting, and uncontrollable spells of howling.

The tumour was composed of large compact masses of cells, with indiscernible cell boundaries and without the characteristic arrangements commonly observed in gliomas. The compact areas contained few blood vessels, but elsewhere the tissue was richly vascularized and contained haemorrhages. The authors conclude that the tumour was definitely anaplastic, somewhat resembling a round-cell sarcoma. They stress its resemblance to a human medulloblastoma, and suggest that it originated in the periventricular layers of immature cells.—ALASTAIR N. WORDEN.

SCHREK, R. (1943). **Studies in Vitro on the Physiology of Normal and of Cancerous Cells. I. The Effect of High Temperature and of Moccasin Venom on the Viability of Rabbit Lymphocytes and Polymorphonuclear Leukocytes as Determined by the Method of Unstained Cell Counts.**—*Arch. Path.* **35.** 857–868. **88**

Rabbit polymorphonuclear leucocytes were found to be more resistant to Moccasin venom and to temperatures of 45°–56°C. than lymphocytes, as determined by the viability test with eosin (3·8 ml. 1 : 2,000 + 0·2 ml. cell suspension) in which dead and dying cells stain, but viable cel s remain unstained.—H. LASER.

EISEN, M. J., & WOGLOM, W. H. (1941). **The Non-specific Nature of Induced Resistance to Tumors.**—*Cancer Res.* **1.** 629–631. **89**

Rats of a highly inbred line which are uniformly susceptible to inoculation with mammary carcinoma, which arose spontaneously in a female of this line, could not be immunized against the tumour with embryo skin from the same line, although the same immunizing material was highly effective in a partially related line. Acquired resistance to transmissible neoplasms is not considered to be specific against the malignant cell, but to be unspecific and to depend upon genetic differences between the animal inoculated and the host animal of the original neoplasm.—H. LASER.

TAYLOR, A. R., BEARD, D., SHARP, D. G., & BEARD, J. W. (1942). **Nucleic Acid of the Rabbit Papilloma Virus Protein.**—*J. infect. Dis.* **71.** 110–114. **90**

Rabbit papilloma virus protein was found to contain 6·5% of carbohydrate (estimated in terms of glucose) and 1·46% of lipoid.

The nucleic acid content was found to be of the desoxypentose or thymus type, and to constitute 8·7% of the whole virus protein. There was no evidence of the presence of ribonucleic acid.

The region of maximum light absorption of the whole protein was about 2,750 Å, while that of the isolated nucleic acid fraction was about 2,630 Å. The latter value was thus near the region of maximum absorption of thymus nucleic acid at about 2,600 Å.

—ISOBEL W. BURTON.

DA CONCEIÇÃO, J. M. (1941). A leucose dos animais domésticos. (Algumas investigações pessoais sôbre a leucose do cão). **[Leucosis in Dogs and Other Animals].**—*Rev. Med. vet., Lisboa.* **36.** 279–308. [French and German summaries]. **91**

The author briefly describes experiments which he made on the transmission of canine leucaemia. After intravenous inoculation of normal dogs with leucaemic blood, there were marked fluctuations in the red and white cell counts. The leucocyte count rose to 20,000, while the red cell count fell to about 4,000,000 per cu. mm., the changes taking place every 23–30 days, and decreasing gradually in intensity. No lesions were found on autopsy of the affected animals.

Most of the paper consists of discussion of the literature on the subject.—ISOBEL W. BURTON.

STURM, E. (1941). **Induced Resistance to a Transplantable Lymphatic Leukemia in Rats.**—*Cancer Res.* **1.** 627–628. **92**

It is known that a definite resistance to transplanted leucaemia in mice may be induced by the injection of embryonic-tissue prior to inoculation. Experiments described in this paper establish that this is also true for a transplantable lymphatic leucaemia. It is considered that this emphasizes further the similarity between transplanted leucaemia and malignant tumours.

—H. LASER.

POTTER, J. S., VICTOR, J., & WARD, E. N. (1943). **Histological Changes Preceding Spontaneous Lymphatic Leukemia in Mice.**—*Amer. J. Path.* **19.** 239–253. **93**

A strain of mice (C.58) showing a high incidence of spontaneous leucaemia was used; 90% of the mice living longer than six months died with some form of leucaemia. The organs of 137 mice of 176–382 days old, which were clinically nonleucaemic, were examined and compared with the corresponding organs of other mice of the same age group. In another series of 24 mice at the period preceding leucaemia, ten lymph nodes were removed singly from each animal at monthly intervals for histologic examination. The results were interpreted as showing that restricted areas of reticulum hyperplasia become the sites for primary malignant lymphocytopoiesis. These areas occur particularly in the medullary tissue of lymph nodes and in perivascular regions of the liver. The concept of a widespread systemic origin of leucaemia may have been due to the relatively late stage of the disease at which tissues have previously been examined.—H. LASER.

I. FRITZSCHE, K. (1941). Die Bedeutung der Pupillen- und Irisveränderungen beim Huhn. **[The Importance of Pupil and Iris Changes in Fowls].**—*Z. InfektKr. Haustiere.* **58.** 5–60. **94**

II. FRITZSCHE. (1942). Nachtrag zu „ Die Bedeutung der Pupillen- und Irisveränderungen beim Huhn ". **[Supplement to " The Importance of Pupil and Iris Changes in Fowls "].**—*Ibid.* 314–315. **95**

I. This is a very detailed account of the iris of the fowl, with especial reference to the changes occurring in neurolymphomatosis. The examination of normal and affected birds was carried out firstly with an ophthalmoscope, the bird being held in a special apparatus so that it could not move its head, and also in histological sections. It is not possible to do more than indicate the main conclusions ; the article should be consulted for further details.

The pupil is bounded by the " pupillary border " which becomes thrown into folds when the pupil closes, and by a pigment-free area of iris which varies in width and is often recognizable macroscopically. The occurrence of isolated cases of slit-like pupils among birds in a flock does not of necessity indicate neurolymphomatosis : mechanical injury produces a similar lesion. Nevertheless, such lesions should be regarded with suspicion in newly purchased birds and, even in flocks in which there has been no previous evidence of

fowl paralysis, it is probably best to slaughter birds with irregular pupils and send them to a laboratory for histological examination of the central nervous system.

A grey iris is not necessarily indicative of neurolymphomatosis nor are such birds more susceptible to the disease than birds with the more usual gold coloured iris. A grey iris was found in up to 12·6% of birds in 47 of 52 flocks. The colour does not remain constant and is particularly liable to change during the autumn moult. The culling of birds with grey eyes is thus unnecessary.

The article is illustrated by numerous tables and schematic representations of the pupil, as well as coloured plates of the eye of normal fowls and of birds with fowl paralysis. The literature is reviewed and there are a number of references.

II. Since the publication of I, F. has had brought to his notice a dissertation by MÜLLER (Munich, 1937) [not available in the United Kingdom] dealing with changes in the iris of fowls. A total of 744 birds varying in age from five months to three years was examined. A brief abstract of this article is given.—E. G. WHITE.

BRANDLY, C. A., NELSON, N. M., & COTTRAL, G. E. (1942). **Serial Passage of Lymphomatosis-Osteopetrosis in Chickens.**—*Amer. J. vet. Res.* **3.** 289–295. **96**

A condition apparently identical with osteopetrosis gallinarum described by JUNGHERR & LANDAUER [*V. B.* **9.** 572.] has been successfully transmitted through six serial passages in chickens. The original inoculum was obtained from fowls affected with typical lymphomatosis. Eighty cases (9% of those inoculated) of osteopathy, were induced in fowls inoculated as baby chicks. Strain and probably family differences in susceptibility were indicated. The incidence amongst males was higher than amongst females.

Associated with osteopetrosis were lesions of lymphomatosis. Thus of 884 chicks inoculated with strain 3 lymphomatosis-osteopetrosis, 361 or 40·8% developed positive lesions. The incidence of lymphomatosis amongst 775 controls was 164 or 21·2%. With the exception of one fowl showing clinical symptoms at the time of writing no case of osteopetrosis occurred amongst the controls.

The association of lesions of osteopetrosis and lymphomatosis may be taken to indicate a single aetiological factor. The virtual absence, however, of osteopetrosis in the controls in which the incidence of lymphomatosis was 21·2% seems to indicate that an additional factor is involved.—F. D. ASPLIN.

OLSON, C., Jr. (1941). **A Transmissible Lymphoid Tumor of the Chicken.**—*Cancer Res.* **1.** 384–392. **97**

A transmissible lymphoid tumour of the chicken is described, with details of thirty serial passages. The results gave no indication of an aetiological connection between lymphoid tumour and fowl paralysis or fowl leucosis.—H. LASER.

TENENBAUM, E. (1943). **A Pure Strain of Rous Sarcoma Cells.**—*Brit. J. exp. Path.* **24.** 56–58. **98**

The cultivation *in vitro* of Rous sarcoma as a pure cell strain without the addition of normal tissue, which so far has been considered a necessary condition, is reported and the morphology and behaviour of such cultures are described. The strain can be subcultured for some time, maintaining its malignant properties, but not for more than six months.—H. LASER.

BISCHOFF, F., INGRAHAM, L. P., & RUPP, J. J. (1943). **Influence of Vitamin B_6 and Pantothenic Acid on Growth of Sarcoma 180.**—*Arch. Path.* **35.** 713–716. **99**

In mice inoculated with sarcoma 180 and receiving synthetic diets containing vitamins B_1, riboflavin, pantothenic acid, and choline, but not B_6, there was a significant decrease in the rate of growth of the tumour. This effect was reversed by feeding vitamin B_6. The addition of vitamin B_6 to the diets of inoculated mice completely deprived of the vitamin B complex resulted in a significant increase of tumour growth. No such effects were found with pantothenic acid. The dietary experiments were short-term, lasting only 20–30 days.

—ALASTAIR N. WORDEN.

See also absts. **62** (antigenicity of chicken tumour), **157** (tumours of the c.n.s.), **251, 252** (tumour inhibition).

DISEASES, GENERAL

MURRAY, J. G. (1943). **Notes on the Subject of Infertility in Cattle.**—*Vet. Rec.* **55.** 323–326. **100**

M. first describes his technique for examination of the genital tract of the cow and discusses the interpretation of *per rectum* findings. Physiological infertility is briefly dealt with under the following headings :– " symptomatic manganese deficiency ", " cystic disease of the ovary ", " failure of cows and heifers to show signs of oestrum ", and " corpus luteum persistens ". Where non-pregnant cows and heifers fail to exhibit the normal manifestation of oestrus, M. distinguishes two categories :– (1) animals in which the reproductive cycle appears to be normal on rectal examination, and (2) those in which there is absence of ovarian activity. For the former condition he proposes the term " suboestrum ", whilst " anoestrum " is restricted to the latter condition.

The present position with regard to the use of stilboestrol and pregnant mare serum in the treatment of infertility is summarized mainly by reference to the published work of other investigators. In a limited number of cases of " suboestrum " treated with 30 mg. stilboestrol subcutaneously M. found that, on an average, seven days elapsed between the injection and the ensuing oestrus or calculated oestrus, whichever was the earlier. A large proportion of 35 anoestrous animals injected intramuscularly with 20 mg. stilboestrol exhibited symptoms of heat in 2–3 days, but in all but one animal the heat was only symptomatic, *i.e.* ovulation failed to occur. M. concludes that the present knowledge of the application of stilboestrol therapy in the field will not allow of recommendation of its use for the treatment of anoestrum. Of 19 cases of anoestrum injected subcutaneously with 1,500 I.U. of pregnant mare serum, only nine showed any apparent ovarian reaction and six of these showed corpus luteum formation. M. concludes that the degree of success likely to follow the use of pregnant mare serum in cases of anoestrum is not as great as was at one time hoped.

—N. J. SCORGIE.

HAMERTON, A. E. (1939). **Review of Mortality Rates and Report on the Deaths Occurring in the Society's Gardens during the Year 1938.**—*Proc. zool. Soc. Lond.* Ser. B. **109.** 281–327. **101**

This annual report is of especial interest as it includes a review of the mortality records from 1925, when serious routine investigations were begun, up to 1938. The figures indicate a distinct improvement in the care of mammals, percentage mortality of which steadily declined from 45% in 1925 to less than 23% in 1935. The position among birds did not show any

corresponding improvement, mortality ranging from 23–31·5% during the period under review. The following table, condensed from the original, indicates the causes of death, as determined by a single investigator with expert assistance when required, from all causes over the decade 1929–39.

Nature of Disease	*Percentage Incidence*		
	Mammals (2,593 deaths)	*Birds* (5,673 deaths)	*Reptiles* (2,049 deaths)
Respiratory system	16·3%	13·8%	16·35%
Digestive system	10·0	17·7	14·43
Cardiovascular system	2·0	4·0	1·4
Urinary system ...	2·1	5·1	1·1
Genital system ...	0·9	2·4	3·9
Nervous system ...	1·0	0·1	—
Endocrine system	0·9	0·1	0·05
Dermatological ...	2·5	1·0	4·7
Hepatic	2·5	2·3	1·3
Pancreatic ...	0·3	0·1	0·05
Joint	0·04	—	—
Tumours and cysts	1·4	0·4	0·2
Mycosis	0·4	4·1	1·8
Tuberculosis ...	3·8	3·3	2·4
Nutritional } ... Metabolic }	7·9	0·9	0·4
Inanition, etc. ...	2·9	2·5	14·7
Animal parasites...	2·8	2·0	9·4
Senescence, injuries, etc. ...	37·1	35·0	30·53
Not ascertained ...	5·2	5·3	15·8

It is not clear from the text whether the heading " tumours and cysts " covers all deaths from neoplastic disease, or whether some of these have been included under organ systems. The improvements resulting from provision of new quarters are clearly shown in detailed examination of some of the causes of loss. Care in the selection of diet has also resulted in improvement throughout the decade, but the interesting statement is made that Platyrrhine primates (New World primates, *Hapalidae*, marmosets) do not respond to ordinary antirachitic treatment.

The report for the year 1938 includes a detailed account of the autopsy of the eight-year-old lowland gorilla, " Mok ", some notes on the outbreak of psittacosis which occurred during the year, and numerous interesting individual case reports.—A. N. Worden.

Chitty, D., & Nicholson, M. (1942). **Canadian Arctic Wild Life Enquiry, 1940-41.**—*J. Anim. Ecol.* **11.** 270–287. [For previous items of the series, see *V. B.* **12.** 347]. **102**

The facts based upon replies to an annual questionnaire. The year 1940–41 was one of almost universal increase in arctic foxes throughout the Arctic and Subarctic and followed a year in which lemmings and snowy owls had started their recovery from the bottom of the previous cycle. There were no widespread epidemics among sledge dogs, but on the west coast of Hudson Bay and in another area " distemper " was spread by contact between teams.—A. N. Worden.

White, J. B. (1943). **Calf Diseases. I.**—*Vet. Rec.* **55.** 275–278. **103**

Lovell, R. (1943). **Calf Diseases. II.**—*Ibid.* 290–291. Discussion pp. 291–292. **104**

I. A clinical account of calf scours, contagious pneumonia, calf diphtheria, and coccidiosis. Some causes of sudden death in calves are also given, *viz*, linseed poisoning, milk tetany, acute lead poisoning from old painted materials, and ragwort poisoning. An outbreak of coccidiosis is also described.

II. L. referred to " white scours " due to *Bacterium coli* and the importance of giving colostrum and maintaining a high standard of animal husbandry so as to avoid disturbing the equilibrium between the organism and the host in favour of the former. In older calves, scours is often caused by *Salmonella dublin*; the diarrhoea is offensive and sometimes bloodstained. Among the causes of contagious pneumonia are *Corynebacterium pyogenes*, a haemolytic coccobacillus, *Pasteurella septica*, a filtrable agent, and lungworms. The discussion included references to colostrum in relation to its antibody and vitamin A contents, parasitic gastritis and husk, and the value of turning calves out to grass during their first year.—E. G. White.

Shigley, J. F., & Thorp, W. T. S. (1943). **Calf Pneumonia.**—*Cornell Vet.* **33.** 218–222. **105**

After a brief discussion of the literature on calf pneumonia, the authors describe 31 cases which they examined. These were characterized by sudden onset, rapid progress, increased respiration, coughing, and depression. There was a watery discharge from the nose and eyes, with a temperature range of 103°–106°F. Histological examination revealed a typical interstitial pneumonia, although such changes appeared to have been superimposed upon a subacute bronchitis. Pleurisy was sometimes present.

Cultural examination from lung tissue revealed in every case a predominating Gram-negative, non-motile rod which is described. Although the organism was thought to play a prominent role in the aetiology of the disease, attempts to establish infection in calves were unsuccessful and the authors surmise that a virus may have been the cause.

Treatment with sulphonamides is discussed.

—N. S. Barron.

Bloom, F. (1943). **A Study of the Renal and Hepatic Altered Nuclei and Intranuclear Crystals in Spontaneous Diseases of the Dog.**—*Cornell Vet.* **33.** 1–16. **106**

Observations were made on the occurrence and distribution of intranuclear crystals and other nuclear abnormalities (vacuolation and homogeneous inclusions) in the liver and kidneys of 32 dogs affected with various disease conditions. The numbers of nuclei with crystals were 0·466% and 0·63% in the liver and kidney respectively: the values for other nuclear changes were 0·17% and 0·1%. There is a discussion of the supposed nature and origin of the changes.

[It is suggested that significant alterations in the incidence of intranuclear crystals occur in distemper and aleucaemic lymphadenosis, but since the number of animals affected with any one disease was in no case more than four it is doubtful whether any conclusions of this nature are justified.]—E. G. White.

Bloomfield, A. L., & Lew, W. (1943). **Increased Resistance to Ulcerative Cecitis of Rats on a Diet Deficient in the Vitamin B Complex.**—*J. Nutrit.* **25.** 427–431. **107**

Spontaneous ulcerative caecitis [see *V. B.* **13.** 434] is enzootic in the rat colony in which these experiments were carried out. The aetiology of this chronic disease is unknown, but it is considered to be undoubtedly infectious. The incidence (3 out of 16) and severity of the lesions was less in a group of rats which had been fed on a diet deficient in the vitamin B complex than

in a control group of rats which had received a complete synthetic diet, and among which 7 out of 14 developed the disease.—Alastair N. Worden.

Malloy, H. T., & Lowenstein, L. (1940). **Hereditary Jaundice in the Rat.**—*Canad. med. Ass. J.* **42.** 122–125. **108**

The problem of hereditary jaundice in the rat was investigated by searching for evidence of a possible haemolytic process or of a possible impairment of bilirubin excretion. No direct evidence of a haemolytic process was obtained, but bilirubin in the serum was invariably indirect in type. An unexplained slight anaemia was always present. Intravenous injection of bilirubin revealed a marked impairment of bilirubin secretion and tying the bile ducts further revealed the abnormality in direct bilirubin formation. It is concluded that the condition is a retention jaundice due to the inability of the liver to make direct bilirubin at a rate sufficient for normal excretion. The affected rats present a close resemblance to the cases of familial jaundice in human beings described by Damashek.

—R. Gwatkin.

Angevine, D. M., & Furth, J. (1943). **A Fatal Disease of Middle-Aged Mice Characterized by Myocarditis Associated with Hemorrhage in the Pleural Cavity.**—*Amer. J. Path.* **19.** 187–195. **109**

A disease of mice is described which has not been previously reported. The disease occurred in healthy, well developed, and well nourished male mice. It was most common between the ages of 10 and 19 months, the peak incidence being at 14 months. P.M. examination revealed myocarditis with haemorrhages into the pleural and pericardeal spaces; these lesions were usually accompanied by testicular haemorrhages. There was no generalized haemorrhagic tendency. No vitamin C or K deficiency was incriminated, nor could any infectious agent be demonstrated.—D. L. Hughes.

Canat, E. H., & Opie, E. L. (1943). **Inflammation in Embryonic Life. I. Changes Produced by Particulate Matter and by a Chemical Agent. II. Infection of Chick Embryos with Avian Tubercle Bacilli.**—*Amer. J. Path.* **19.** 371–383 & 385–394. **110**

I. The authors have studied the reaction of the developing chick embryo to injury by trauma or such irritants as carbon particles and turpentine. In the three-day embryo there was evidence of phagocytosis of particulate matter by mononuclear cells which were largely derived from perivascular cells having the characters of haemocytoblasts. At 6–8 days, small numbers of granular leucocytes collect in response to injury; these cells arise for the most part from local transformation of haemocytoblasts. It also appears that haemocytoblasts can be converted under the influence of suitable stimuli into histiocytes (macrophages). By the 17th–19th day of incubation, the inflammatory response has changed to the type found in post-embryonic life and injury evokes prompt accumulation of granulocytes by emigration from the blood vessels.

II. Developing chick embryos were inoculated with avian tubercle bacilli (0·05–2·0 mg. moist viable growth) and the reactions of the chorio-allantois and embryo were studied after varying intervals. The organisms invaded both ectodermal and mesodermal cells and caused them to proliferate; areas of focal necrosis sometimes developed. In early embryos, up to six days, there were numerous wandering cells containing very large numbers of tubercle bacilli, probably formed by intracellular multiplication. The granulocytes which accumulated were derived from local development of haemocytoblasts through the stages of granuloblast and myelocyte. Circumscribed nodules were formed, composed of embryonic fibroblasts and mononuclear cells containing tubercle bacilli; no typical tubercles were formed owing to the absence of epithelioid cells. Near the end of incubation the reaction became similar to that of post-embryonic life and there was emigration of granulocytes from the blood vessels. Resistance to multiplication and invasion of tubercle bacilli increased coincident with the local increase in the number of granulocytes.—E. G. White.

Green, H. N. (1943). **Shock-Producing Factor(s) from Striated Muscle. I.—Isolation and Biological Properties.**—*Lancet.* **245.** 147–153. **111**

Bielschowsky, M., & Green, H. N. (1943). **Shock-Producing Factor(s) from Striated Muscle. II.—Fractionation, Chemical Properties and Effective Doses.**—*Ibid.* 153–155. **112**

I. A study was made of the factors responsible for symptoms of, and death from, traumatic shock. The lethal effect of prolonged occlusion of a limb followed by release suggested that a toxic substance was released into the general circulation from the asphyxiated limb. An extract of the muscle (muscle shock factor = M.S.F.), if prepared very rapidly after death, on injection by various routes was found to produce typical symptoms of shock, many of which were characteristic also of the state produced by limb ischaemia. Thus, typical symptoms were :– (1) survival time proportional to the dose of M.S.F. and the duration of ischaemia; (2) local oedema and exudation and generalized increase in tissue permeability; (3) prolonged fall in blood pressure; (4) fall in respiratory rate; (5) fall in body temperature; (6) haemoconcentration; (7) renal dysfunction; (8) rapid recovery from sublethal doses of M.S.F. and sublethal periods of ischaemia, and acquired tolerance to increased dose or period.

The depressor factor was labile towards acid while the shock-producing factor remained stable. Biological properties of the former suggest that it is an adenine derivative and both depressor and shock-producing effects were imitated by injecting adenosine triphosphate. After acid treatment or incubation with blood or tissue extracts, both of which treatments would destroy the adenosine radical, a shock-producing property remained although the depressor effect was destroyed. This effect would be due to the shock-producing power of the pyrophosphate radical.

II. The method of extraction of the shock-producing factor from muscle is described. Delay between death of an animal and extraction of the M.S.F. greatly decreased the potency of the preparation. The reactions of different species were not the same; thus the cat was most tolerant, the rat, mouse, and rabbit less tolerant, and the g. pig least tolerant; the lethal dose was greater by the intraperitoneal route than the intravenous and the reaction of different species to injection by the two routes did not run parallel. This observation suggested that the cause of death was not the same in the two cases. Fractionation of the preparation yielded adenosine triphosphate which accounts for the depressor effect and in part for the shock-producing effect.—R. McAnally.

Hass, G. M., Huntington, R., & Krumdieck, N. (1943). **Amyloid. III. The Properties of Amyloid Deposits Occurring in Several Species under Diverse Conditions.**—*Arch. Path.* **35.** 226–241. [For part II, see *V. B.* **13.** 364, abst. 2438]. **113**

A comparative study of amyloid disease in man, horses, and rabbits. In observations made, causes of amyloid deposition in man were chronic TB. and plasma cell myeloma. In horses, amyloid disease followed

prolonged immunization with one or more non-infective antigens (diphtheria, tetanus, and streptococcal toxins); no amyloid was found after prolonged immunization with killed pneumococci and the most effective stimulus to its production was tetanus toxin. In the rabbit, amyloid disease was readily produced by repeated injections of old tuberculin into animals infected with bovine tubercle bacilli. The distribution of amyloid varied in the three species examined. In the rabbit, the spleen was severely affected; in man, most of the amyloid was situated in the liver. Renal amyloid was most pronounced in the rabbit, less marked in man, and absent in the horse. Repeated injection of sodium caseinate into mice failed to cause amyloid deposition.

The solubility of the amyloid matrix under various conditions was investigated. All amyloid gave the characteristic staining reactions with aniline dyes. The iodine reaction was very pronounced in man and weak or absent in the horse and rabbit.—E. G. WHITE.

TOMPKINS, E. H. (1943). **Effects of Intravenous Injections of the Ether-Insoluble Fraction of Lipoids of Beef Brain. A Comparison with the Lipoid Storage Diseases and with the Effects of the Injections of Phosphatides Alone.**—*Arch. Path.* **35.** 787–802. **114**

Intravenous injections were made into non-pregnant adult female rabbits of ether-insoluble lipoid fractions (sphingomyelins + galactolipids) obtained from a dry benzene extract of beef brains. The effects included an increase in the white blood cells, mainly of neutrophiles and lymphocytes, medullary hyperplasia, splenomegaly, and macrophage infiltration of the reticulo-endothelial system and of the lung. The macrophages involved in this infiltration differed morphologically from those previously noted to occur as a result of injections of lecithin, and differed somewhat from those resulting from the injection of sphingomyelin alone, but bore a close resemblance to the foam cells noted in Gaucher's disease.—ALASTAIR N. WORDEN.

HIRSCH, E. F. (1941). **Relation of the Chemical Composition of Lipids to Characteristic Tissue Lesions.**—*Arch. Path.* **31.** 516–527. **115**

A survey of information dealing with the chemical composition of lipoids concerned in various tissue lesions revealed the following points:—(1) in systemic disorders and pathological tissues when fat finds its way into the structure of the body, it is not readily disposed of and may be the cause of local tissue reactions; (2) neutral fat has no specific effect in tissues other than that of any inert foreign material; (3) hydrolysis of fat occurs in tissues with resultant development of acidity which causes necrosis around the fat deposit; (4) the effects of free fatty acids depend mainly upon their physical condition, but some have specific effects, as for example a liquid saturated acid from tubercle bacilli which stimulates the formation of tuberculous tissue; (5) the nature of the soaps formed by neutralization of fatty acids affects the tissue reactions; (6) in Schüller-Christian disease, xanthomatosis, xanthoma, and atherosclerosis, although cholesterol and its esters are predominant in the deposits, other lipoids are also present; the fat deposits are probably the result of disintegration of phagocytes which have collected unmetabolized lipoid from the tissues; local tissue reactions then occur at the site of deposition; (7) also, mixed lipoid deposits occur in Niemann-Pick disease and Gaucher disease, but in the former sphingomyelin predominates and in the latter cerasin.—R. McA.

SCHENKEN, J. R., BURNS, E. L., & McCORD, W. M. (1942). **Occurrence of Urinary Calculi in Inbred Strain (C_3H) of Mice Treated with Oestrogen.**—*Endocrinology.* **30.** 344–352. **116**

Urinary calculi were found in 43·7% of male mice strain C_3H) treated with varying doses of α-oestradiol benzoate; the incidence in the controls was 4·1%. In female mice, the incidence was 3·4% in the treated and 5·4% in the controls. The calculi were of the "bone-earth" type, the inorganic material consisting of calcium and magnesium phosphates. Various histopathological changes similar to those observed by other investigators are described. There is some evidence that the formation of the calculi is associated with a derangement of the calcium metabolism and with the various inflammatory reactions present in the urinary tract.—ALFRED T. COWIE.

MOORE, R. D. (1943). **Calcification of the Bone Marrow in Toxic Hyperparathyroidism.**—*Arch. Path.* **36.** 51–57. **117**

Toxic doses of parathyroid solution were given to six white rats. P.M. examination showed that calcification, which had already been demonstrated under the same circumstances in bone-marrow, had also occurred in kidney, stomach, heart, and liver. The process was thus not characteristic of regions where mobilization of bone salt was taking place. In all organs, calcification was accompanied by local necrosis. It is suggested that hypercalcaemia and hyperphosphataemia, together with focal degeneration, are the cause of the deposition of Ca.—R. McANALLY.

DA ROSA, F. M. (1941). Os genes letais nos vertebrados superiores.—Sua importância nas espécies domésticas. **[Lethal Genes in the Higher Vertebrates].**—*Rev. Med. vet., Lisboa.* **36.** 251–278. **118**

A general review on the subject of lethal genes, illustrated by numerous examples from the literature. There is a bibliography of 88 references.—I. W. BURTON.

WILLIS, R. A., & RUDDUCK, H. B. (1943). **Testicular Teratomas in Horses.**—*J. Path. Bact.* **55.** 165–171. **119**

An illustrated description of testicular teratomas in two colts. In one animal, there were multiple tumours, 10–12 in each testis. A brief review of some of the literature suggests that testicular teratomas are probably more frequent in young horses than in any other mammals, that they are most common in normally descended testes but are seen also in cryptorchids, and that a detailed study of the growths in horses may elucidate some of the outstanding problems of human testicular teratomas.—E. G. WHITE.

CLOETE, J. H. L., & STEYN, H. P. (1940). **Anatomical Studies No. 63: an Abnormal Bovine Heart.**—*Onderstepoort J. vet. Sci.* **14.** 481–488. **120**

A case is described of an abnormal heart in a bull calf which was born at full term and was probably born alive although found dead soon after birth. The left atrium had no ventricular communication, but there was a patent foramen ovale; in the right atrium there were no unusual features. The right ventricle comprised almost the entire ventricular portion of the organ. A slight longitudinal elevation of the right myocardial wall incompletely divided the chamber into two compartments. The right atrium opened into the cranial portion. Just below the tricuspid valve there was a foramen into the vestigial left ventricle. The latter had only one opening—that into the right ventricle. There was a common arterial stem which, with the single functioning ventricle, maintained the foetal circulation.

The significance of the case as it affects the study of the foetal circulation is discussed at length.—E. M. R.

GODGLÜCK, G. (1942). Ueber den Abgang der rechten Kranzarterie aus der Pulmonalis und gleichzeitiger Reduktion der Pulmonalisklappen bei einem Rinde. **[Abnormalities of Arteries in a Cow, the Right Coronary Artery Originating from the Pulmonary Artery Together with Reduction of the Pulmonary Artery Valves.**—*Arch. wiss. prakt. Tierheilk.* **77.** 231–243. **121**

G. has found only two records of errors of development of the coronary arteries in animals, both in cattle. The case described in detail and illustrated was in a six-year-old cow, slaughtered because of a sudden attack of respiratory distress. The left coronary artery had its origin in the aorta, whereas the right arose from the pulmonary artery, just beyond the semilunar valve. The latter had only two cusps. Both coronary arteries were dilated and tortuous. Histological examination showed hypertrophy of the adventitia and diminished thickness of the media in both coronary arteries. The possible embryological significance of the abnormality is discussed at some length.—E. G. WHITE.

VERHAART, W. J. C. (1942). **Partial Agenesis of the Cerebellum and Medulla and Total Agenesis of the Corpus Callosum in a Goat.**—*J. comp. Neurol.* **77.** 49–60. **122**

A clinical and anatomical description of a case of complex malformation of the central nervous system in a goat. There was agenesis of the midline areas of the cerebellum, including the vermis and medial halves of the hemispheres, underdevelopment of the areas of the vestibular and cochlear nuclei in the medulla, and absence of the corpus callosum. These changes were due in part to coalescence of the alar plates of the rhombencephalon followed by hydrops of the cranial part of the fourth ventricle and the whole of the third ventricle.

The animal showed no gustatory, vestibular, nor cochlear reactions, no righting reflexes nor horizontal ocular movements. Cerebellar symptoms comprised jerking of the head and incoordinated movements of the legs when the animal was held suspended; it could not stand.—E. G. WHITE.

DOW, R. S. (1940). **Partial Agenesis of the Cerebellum in Dogs.**—*J. comp. Neurol.* **72.** 569–586. **123**

A detailed clinical and histopathological record of partial cerebellar agenesis in two littermate female Boston terriers. The dogs were affected with ataxia of complex nature and were found to have comparable degrees of agenesis of the cerebellum. The original should be seen for further details.—J. E.

See also absts. **59**, **60** (serum jaundice), **128** (canine cystinuria), **253** (endometritis), **254** (infectious enteritis in swine).

NUTRITIONAL AND METABOLIC DISORDERS

KIRK, W. G., & CROWN, R. M. (1942). **Deficiency Symptoms in Growing Pigs Fed a Peanut Ration.**—*Bull. Fla agric. Exp. Sta.* No. 372. pp. 52. **124**

In Florida, some 227,000 acres of peanuts were utilized for livestock feeding in 1937, about 75% of the crop being fed to pigs. It is estimated that 80% of all marketed pigs are fattened on the crop, while many of the breeding herds are partially maintained for several months of the year in the peanut fields. The resulting pork is soft but said to be of excellent quality. Posterior paralysis is common during autumn and winter months in fattening pigs and lactating sows.

In an endeavour to ascertain the deficient factors, feeding trials with Poland China pigs were carried out, and the effects noted of supplementing shelled peanuts with calcium carbonate, salt, and cod liver oil. The best results were obtained when a ration of peanuts + 2% $CaCO_3$ + 2 g. of salt daily was used; the further addition of 1% cod liver oil apparently lowered the rate of body weight gain.—ALASTAIR N. WORDEN.

GOVAN, A. D. T. (1943). **The Production of Fatty Degeneration of Heart Muscle by a High Fat Diet.**—*J. Path. Bact.* **55.** 351–356. **125**

Rabbits weighing 1·25–2·5 kg. were fed for periods ranging from four days to 11 weeks with 30 ml. per kg. body weight per day of a mixture of equal parts of cream and milk, administered by stomach tube. The animals continued to receive their daily ration of oats and green food, and at the end of the experimental periods were killed and examined both macroscopically and histologically for the presence of cardiac lesions. In many instances, but only in rabbits which were in a good nutritional state (*i.e.*, had considerable amounts of natural fat in their depots), fatty degeneration of the cardiac muscle was observed. The lesions, which in some instances occurred in animals dosed for only five days, resembled those associated with poisons or anaemia.—ALASTAIR N. WORDEN.

ORTEN, A. U., & ORTEN, J. M. (1943). **The Role of Dietary Protein in Hemoglobin Formation.**—*J. Nutrit.* **26.** 21–31. **126**

The administration of a diet low in protein to young rats produced a mild chronic anaemia, characterized by low haemoglobin levels and high reticulocyte counts, and also poor weight increases as compared with controls fed upon an adequate protein diet. Both effects were somewhat enhanced if the low protein diet was made up to the same calorific value as the high protein diet by increasing the fat and sucrose content of the former. The blood of the anaemic rats returned to normal and weight increases were resumed if the low protein diet was changed to an adequate protein diet. The anaemia could not be cured by feeding extra iron. —R. MCANALLY.

ALMQUIST, H. J. (1942). **The Amino Acid Requirements and Protein Metabolism of the Avian Organism.**—*Fed. Proc. Amer. Soc. exp. Biol.* **1.** 269–273. **127**

A certain amount of dietary glycine (about 1%) is essential for the chick, since, although the bird appears able to synthesize glycine to some extent, the amount produced is insufficient to promote optimum growth. Levels above 2% of glycine are toxic to chicks. Embryos with chondrodystrophy contain less glycine than normal embryos, probably as the result of underdevelopment of the cartilaginous tissues, the proteins of which are rich in glycine. Glycine deficiency in the chick is characterized by poor growth and muscular underdevelopment, extreme weakness, and a low muscle creatine content. Creatine, for which glycine is a precursor in both the chick and the rat, and also arginine, are instrumental in preventing the syndrome, and in addition improve the imperfect feather development which is usually observed in glycine deficiency. Feathers contain 6% arginine and 9·5% glycine and therefore deficiency of these substances is most marked in rapidly feathering breeds. The chick appears to be unable to synthesize arginine and rapidly loses weight when this is deficient in the diet. Citrulline, but not ornithine, is an effective substitute. Methionine is essential for the chick and can replace cystine, but cystine, though exerting a sparing action on methionine, cannot replace it. Homocystine replaces methionine only if ample choline is present. Methionine cannot replace choline

as a factor in the prevention of perosis in chicks and turkeys. Tryptophane, lysine, and histidine are other amino acids known to be dietary essentials for the chick. —E. M. CRUICKSHANK.

HESS, W. C., & SULLIVAN, M. X. (1943). **Canine Cystinuria. Urinary Excretion of Cystine Following the Administration of Homocystine, Homocysteine, and some Derivatives of Cystine and Cysteine.**—*J. biol. Chem.* **149.** 543–548. **128**

The addition of homocystine, S-carboxymethyl-cysteine, diglycylcystine, thiazolidinecarboxylic acid, tetrapotassium tetracarboxymethylcystine, or dipotassium dicarboxymethylcystine to the basal diet of the two male cystinuric Irish terriers previously studied [see *V. B.* **12.** 548.] was without effect on the urinary excretion of cystine, and slight increases only were noted following the addition of homocysteine and glycylcysteine. It is therefore concluded that when the S, S + N, or N of cysteine is bound to some other chemical group, there is little or no extra formation of urinary cystine.—ALASTAIR N. WORDEN.

TERESI, J. D., ELVEHJEM, C. A., & HART, E. B. (1942). **Molybdenum in the Nutrition of the Rat.**—*Amer. J. Physiol.* **137.** 504–508. **129**

The body stores of molybdenum in unweaned rats (six litters), were made as low as possible by placing their mothers, two weeks after parturition, on a diet of goat's milk, mineralized with Fe, Cu, and Mn. At weaning, the young rats were started in two groups on a basal ration of mineralized goat's milk supplemented with halibut oil. One group was supplied with 30 μg. Mo as sodium molybdate to every 75 ml. of drinking water. Growth records were kept for six weeks. On an assumed daily intake of 40 ml. of milk, the control rats received 0·5–0·6 μg. Mo per day in the milk ration and, since supplementing this ration with 30 μg. Mo did not accelerate growth, it is concluded that, if Mo is needed by the growing rat, then 0·5 μg. per day satisfies this requirement. Data are given for the Mo content of cow's milk and goat's milk.—W. R. MUIR.

SHILS, M. E., & MCCOLLUM, E. V. (1943). **Further Studies on the Symptoms of Manganese Deficiency in the Rat and Mouse.**—*J. Nutrit.* **26.** 1–19. **130**

The most important feature in the feeding of diets deficient in Mn to rats is the rapid death of the young after birth, slow growth of the female, and sterility of the male, which are all reversible on addition of Mn to the diet. A hitherto undescribed symptom of Mn deficiency was observed in young rats born of deficient mothers and was characterized by loss of equilibrium and co-ordination. The P.M. findings in this condition are not described. A marked decrease in arginose activity of the livers of the deficient rats was also noted. —G. D. S.

COWARD, K. H., KASSNER, E. W., & WALLER, L. W. (1943). **The Availability of the Calcium of Milk.**—*Brit. med. J.* July 10th. 39–40. **131**

In order to determine whether the calcium of milk is more readily available than the Ca of inorganic salts, groups of young rats were fed upon "poorer class diet", liberally supplemented with cod liver oil to which had been added graded doses of Ca in the form of an inorganic Ca and phosphate salt mixture or graded doses of milk of equivalent Ca content. The groups fed milk put on more weight in the five weeks of the experiment, but comparison of the percentage and total ash in the humerus and femur showed no significant difference between the groups fed milk and those fed inorganic salts.—R. MCANALLY.

JOLLIFFE, N., & GOODHART, R. (1942). **Vitamins in the Practice of Medicine.**—*Fed. Proc. Amer. Soc. exp. Biol.* **1.** 316–319. **132**

Undernutrition may be the result of poverty or of failure to consume the proper types of food. An apparently adequate diet may prove to be grossly inadequate owing to increased requirements resulting from strenuous work, insufficient rest, or the onset of disease. Failure to absorb one or more of the vitamins or other essential food constituents may ensue from obstruction of the biliary tract or pancreatic ducts or from the onset of diseases such as sprue or coeliac disease and all conditions accompanied by diarrhoea. The anatomical changes brought about by relatively advanced degrees of deficiency of the different vitamins and the laboratory procedures used for the detection of malnutrition are tabulated, as also are the daily allowances of specific nutrients recommended by the National Research Council. The authors consider that these allowances should be regarded as the minimum requirements necessary to maintain health. Some general statements about the use of vitamins include the following. The daily therapeutic dose should be at least five times the maintenance requirement, but many times this amount may be given without detrimental effect. Oral administration is to be preferred, but where this is not feasible, hypodermic or intramuscular injection may be used. Intravenous administration is wasteful, as large amounts may be lost in the urine, even in very deficient subjects. No advantage has been demonstrated for the intrathecal injection of vitamins in any condition. —E. M. CRUICKSHANK.

MOLITOR, H. (1942). **Vitamins as Pharmacological Agents.**—*Fed. Proc. Amer. Soc. exp. Biol.* **1.** 309–315. **133**

In normal animals, the action of vitamins is unspecific and pharmacodynamic effects are produced only by doses several thousand times greater than those needed for a therapeutic dose. The lethal dose of riboflavin, for example, is 2,000 times the daily requirement and that of pyridoxine 100,000 times. In a vitamin-depleted animal, on the other hand, vitamins restore to normal the pathological changes induced by a specific deficiency, and under such conditions their action is similar to that of powerful medicinal agents, the effect of minute doses being quite marked. Nicotinic acid is the only vitamin which produces a distinct pharmacological effect even in therapeutic doses. In man, its administration is followed by a transitory peripheral vasodilation, but this reaction is not observed with nicotinic amide, which is equally effective as the vitamin. There is little or no danger of acute toxicity as the result of the administration of vitamins in large doses, but since vitamin therapy is often carried out over a prolonged period, the possibility of chronic toxicity should not be overlooked. There is evidence in rats that prolonged administration of thiamine causes in the third generation loss of maternal instinct and interferes with lactation. This effect of thiamine is associated with a relative lack of manganese in the diet. The toxicity of vitamins is considerably greater when they are given intravenously than when given perorally, and intravenous toxicity depends greatly on the rate of injection. Intravenous injection produces a much higher temporary concentration of the vitamin in the blood and tissues than peroral administration, and the pharmacodynamic effect is more rapid. In lactation, pregnancy, and infectious diseases, the vitamin requirements are greatly increased. Mice on a suboptimal riboflavin intake are less resistant to pneumococcus I infection. In mice infected with influenza virus, the pantothenic acid content of the liver is reduced to 58 μg. per g. as

compared with 82 μg. per g. in control animals.
—E. M. CRUICKSHANK.

SLANETZ, C. A. (1943). **The Adequacy of Improved Stock Diets for Laboratory Animals.**—*Amer. J. vet. Res.* **4.** 182–189. **134**

It is pointed out that, whereas the vitamin requirements of different laboratory species, particularly the rat, have been studied in considerable detail with the aid of synthetic diets, relatively little critical work has been reported on the vitamin content of stock laboratory diets. A study was therefore made, by rat assay methods, of the vitamins A, B_1, B_6, riboflavin, pantothenic acid, "choline equivalent" and vitamin E contents of six commercial stock diets designed for rats, mice, g. pigs, and rabbits. When compared with the manufacturer's claims, the analyses indicated some lowering, presumably due to loss on storage, of vitamin A, but otherwise the diets appeared satisfactory in the light of present knowledge. It is, of course, stressed that the vitamin requirements of the mouse, and to a much greater extent those of the rabbit and g. pig, are imperfectly known.

Nitrogen and mineral analyses were likewise considered to be satisfactory.—ALASTAIR N. WORDEN.

MELLANBY, E. (1943). **The Effect of Bone Dysplasia (Overgrowth) on Cranial Nerves in Vitamin A-Deficient Animals.**—*J. Physiol.* **101.** 408–431. **135**

A careful anatomical and histological study was made of the changes occurring in the cranial nerves and adjacent bony tissues of puppies kept from the age of 6–10 weeks on a diet low in vitamin A. Litters of puppies were placed on the diet, and one or more animal in each litter was given supplementary vitamin A or carotene, and acted as a control. When the characteristic nervous symptoms developed (after 2–6 months), the animals were killed, and then blocks of tissue containing the different nerves with the adjacent bone were examined.

Detailed descriptions of the anatomical and histological findings are given. The main conclusions were as follows. Local overgrowth and malformation of certain skull bones, involving an increase in cancellous bone with or without decrease in compact bone (the latter depending apparently on the Ca, P, and vitamin D content of the diet), caused compression, twisting, and lengthening of most cranial nerves, accompanied in certain cases by extensive degenerative changes. The destructive changes were largely confined to the sensory nerves, particularly the fifth and eighth nerves, where the ganglion cells as well as the nerve axons were affected by bone overgrowth. The motor cranial nerves for the most part escaped damage, often suffering considerable compression, lengthening, and twisting without degenerating. In the optic nerve, a primary degenerative change beginning in the retina itself, and associated with bleaching of the tapetum due to early vitamin A deficiency, apparently preceded the later degenerative changes due to bone overgrowth and increased intracranial pressure.—D. G. GILMOUR.

MOORE, L. A. (1941). **Some Ocular Changes and Deficiency Manifestations in Mature Cows Fed a Ration Deficient in Vitamin A.**—*J. Dairy Sci.* **24.** 893–902. **136**

Six mature cows were placed on vitamin A deficient rations which supplied only 2–3 μg. carotene daily per lb. body weight. Nyctalopia, incoordination and oedema of the legs appeared in these cows after periods which apparently varied with the individuality, nutritional history, degree of fatness, and presence of lactation or pregnancy in each animal. Blindness due to constriction of the optic nerve did not develop as it did in previous experiments with calves [see *V. B.* **11.** 123 and 242.] even though certain animals were allowed to reach an extreme state of deficiency. Papilloedema developed less readily than in calves. It failed to appear in two cows and occurred in the others only when considerable incoordination was present. Nevertheless, once developed, the papilloedema took a considerable time to recede even when certain animals were returned to pasture or good winter rations. Ophthalmoscopic examination also revealed relatively early changes in the tapeta. The tapetum nigrum appeared mottled and the tapetum lucidum was bleached and occasionally also mottled. These changes (which are illustrated in colour) responded to administration of vitamin A. Xenophthalmia was not observed, but certain animals showed considerable lachrymation and some clouding of the cornea. In these mature cows, symptoms of vitamin A deficiency appeared when the plasma carotene was between 0·5–0·2 μg. per ml. whereas, in calves, the plasma carotene had usually fallen to 0·13 μg. per ml. before the first deficiency symptoms appeared. One Guernsey cow which died apparently failed to utilize carotene stored in its body fat.—W. R. MUIR.

GALLUP, W. D., & KUHLMAN, A. H. (1941). **Carotene Content of the Blood Plasma of Dairy Cattle in Relation to Vitamin A Deficiency.**—*Proc. Okla. Acad. Sci.* **21.** 89–92. **137**

Data are reported for the carotene content of the plasma of Jersey cows at monthly intervals throughout complete gestation and lactation periods. The cows were maintained on one-quarter, one-half, or full allowances of prairie hay which provided the only source of carotene in the ration. The data indicated a close relationship between plasma carotene and carotene intake, but variations between individuals were sometimes large and carotene intake is not the only factor affecting the level of plasma carotene. This level usually fell immediately after calving, but there was no consistent change in plasma carotene values as lactation advanced. From a study of the plasma carotene levels of 16 cows during 26 gestations in relation to calf mortality and health of the cows, it appeared that a plasma carotene of 150 μg. per 100 ml. in the pregnant Jersey cow indicates a border-line deficiency of vitamin A.—W. R. MUIR.

HART, G. H., GOSS, H., & GUILBERT, H. R. (1943). **Vitamin A Deficiency Not the Cause of Joint Lesions in Horses.**—*Amer. J. vet. Res.* **4.** 162–168. **138**

An experiment was carried out with four pure-bred Percherons, two of which were provided with a basal vitamin A deficient diet only [see HOWELL *et al.*—*V. B.* **11.** 470.], and two with the basal diet plus about 90,000 I.U. of vitamin A per day in the form of a shark liver oil supplement. Night blindness appeared after 218 and 502 days respectively in the two deficient animals, which also had low blood-vitamin A values. One of the deficient animals died naturally, and the three other horses were slaughtered: P.M. examination revealed joint lesions in every case, similar to those previously described.

It is therefore concluded that vitamin A is not the factor concerned in the production of joint lesions, which are due to lack of some unknown substance in the basal diet. The blood-ascorbic acid levels were not significantly different in the two groups.—A. N. WORDEN.

REIFMAN, A. G., HALLMAN, L. F., & DEUEL, H. J., Jr. (1943). **The Effect of Concentration on the Absorption of Vitamin A.**—*J. Nutrit.* **26.** 33–42. **139**

The uptake of solutions of vitamin A in different concentrations was studied in previously fasted rats. The rate of absorption was found to be directly pro-

portional to the concentration of the administered material, and bore no relationship to the absorption of neutral fat. When the vitamin preparations were introduced by stomach tube, and the intestinal tract immediately removed and preserved for three hours at 37°C., no destruction took place, and this is accepted as evidence that bacterial destruction played no part in the disappearance of vitamin A from the alimentary tract of the experimental animals.—A. N. Worden.

McGowan, J. P. (1942). **On Ossification and Vitamin D Action.**—*Edinb. med. J.* **49.** 190–199. **140**

The role of vitamin D in ossification is critically discussed, especially with regard to bone enzyme activity and the essential nature of phosphorus compounds.—R. Allcroft.

McChesney, E. W. (1943). **Studies of Calcium and Phosphorus Metabolism in the Chick. I. The Comparative Effect of Vitamins D_2 and D_3 and Dihydrotachysterol given Orally and Intramuscularly.**—*J. Nutrit.* **26.** 81–94. **141**

When given orally, the ratio of effectiveness of $D_3 : D_2$ is 35 : 1 and that of dihydrotachysterol : D_3 is approximately 4·5 : 1 (rat unit for rat unit). Vitamin D_2 injected intramuscularly in either corn oil or propylene glycol at the same unit dose level as vitamin D_3 exerted a much inferior antirachitic effect. Dihydrotachysterol given intramuscularly in oil was not as effective relative to vitamin D_3 as when the two preparations were given orally. Vitamins D_2 and D_3 administered orally in doses equivalent in antirachitic effect for the chick, maintained normal calcium and phosphorus metabolism. A similar dosage of dihydrotachysterol was less effective. Vitamin D_2 and dihydrotachysterol given intramuscularly in oil resulted in retardation of growth, extreme weakness, and a consequent high mortality. The reason for this is not clear. Vitamin D_3 given intramuscularly in propylene glycol was much better utilized than when given orally in oil. When given intramuscularly in oil, it was much less effective than when given orally.

—E. M. Cruickshank.

Kaunitz, H., & Pappenheimer, A. M. (1943). **Oxygen Consumption in Vitamin E Deficiency.**—*Amer. J. Physiol.* **138.** 328–340. **142**

Comparison of the *in vitro* O_2 consumption by the skeletal muscle of young rats, born of vitamin E deficient mothers, showed that the rate was higher in untreated rats than in littermates which received a protective dose of synthetic α-tocopheryl acetate (vitamin E). The same results were obtained in chick experiments. Also vitamin E deficiency had no demonstrable effect upon the *in vitro* O_2 uptake of rat liver.

Determinations of the total O_2 consumption, from 11 days to five months of age, of rats on a stock diet and on a vitamin E deficient diet, supplemented and unsupplemented by a single dose of synthetic vitamin E, were made. A single dose of vitamin E significantly lowered the O_2 consumption, and this difference between treated and untreated litter-mates persisted until the 60th–70th day. No satisfactory explanation could be given for the similarity of the O_2 consumption of rats on stock and vitamin E deficient diets.—R. O. M.

Daft, F. S., Endicott, K. M., Ashburn, L. L., & Sebrell, W. H. (1943). **Vitamin E Deficiency in Rats Given Succinyl Sulfathiazole in Purified Diets.**—*Proc. Soc. exp. Biol., N.Y.* **53.** 130–131. **143**

Lesions similar to those earlier described [see Ashburn *et al.* and Daft *et al.*—*V. B.* **13.** 396 & 397.] were reproduced in rats receiving a purified diet containing 1% of sulphasuccidine, but not containing any α-tocopherol. Lesions did not appear in control rats receiving both the sulphasuccidine and a weekly oral supplement of 3 mg. of α-tocopherol, nor in other controls receiving neither sulphasuccidine nor α-tocopherol.—Alastair N. Worden.

Maltaner, F., & Thompson, W. R. (1943). **Chemical Analyses of the Blood Plasma of Chicks Deficient in Vitamin K.**—*Arch. Biochem.* **2.** 49–54. **144**

After receiving an adequate diet for the first 24 days of life, one group of White Leghorn chicks was provided with a vitamin K deficient ration, while a comparable group served as controls. Over an experimental period ranging from 4–6 weeks, there were no significant differences between the two groups in respect of body weight, or of plasma inorganic P, lipoid P, and Ca.—Alastair N. Worden.

Maltaner, F., & Maltaner, E. (1943). **The Rôle of Cephalin and "Thromboplastin" in the Coagulation of Vitamin-K-Deficient Chick Plasma.**—*Arch. Biochem.* **2.** 37–47. **145**

White Leghorn chicks, initially 4–6 weeks of age, were provided with a vitamin K deficient diet. The characteristic haemorrhagic symptoms appeared after 2–3 weeks, but the birds grew normally and appeared in excellent health, except that they manifested a striking depigmentation of the leg-scales, skin, comb, beak, blood-plasma, and, in the case of pullets, of the yolks of the eggs which they laid. Administration of 2-methyl-1,4-naphtho-quinone restored the clotting power of the plasma but failed to restore pigmentation, and carotene was also without effect.

The blood plasmas of deficient chicks failed to clot after incubation with cephalin and $CaCl_2$, but clotted promptly when fresh or heat-treated mammalian serum was added. Neither normal nor deficient plasma clotted with fresh chick serum. In experiments with normal chick blood, marked prothrombin activity, which could be demonstrated by the method employed in fresh but not in heated mammalian serum, was not found either in fresh or in heated serum.

Very young chicks to which the deficient diet was fed died in 4–5 weeks.—Alastair N. Worden.

Prados, M., & Swank, R. L. (1942). **Vascular and Interstitial Cell Changes in Thiamine-Deficient Animals.**—*Arch. Neurol. Psychiat., Chicago.* **47.** 626–644. **146**

By methods identical with those previously described [*V. B.* **11.** 54.], acute, semi-acute, and chronic avitaminosis-B_1 was produced in pigeons, and a similar technique was adapted to cats and kittens. Haemorrhages secondary to vascular dilatation occurred in the brains of deficient pigeons, appearing firstly in the vestibular nuclei and spreading later to other areas, but they were found only in local regions containing degenerating neurons, and were never present in the absence of parenchymal changes. Neuronal changes, however, were frequently present in the absence of haemorrhages and were preceded by parenchymal changes. Hyperaemia also preceded haemorrhage, and in some cases spread to parts of the brain where the neuronal structure was still normal. It is suggested that vascular dilatation and permeability were influenced by accumulation of metabolites in the surrounding tissues.

It was possible to produce a highly acute deficiency in kittens, which became unable to vomit, prostrate, and died within 7–8 days. Marked changes (chromatolysis, vacuolation, nuclear dissolution, and finally cell disappearance) were noted in large ganglion cells throughout the brains of such animals, while there was a diffuse swelling of oligodendrocytes and clasmatodendrosis of astrocytes; haemorrhages were not noted. In chronically deficient kittens, oligodendrocytes were

little altered, astrocytes were markedly hypertrophied, and in one case only (out of 13) there were small haemorrhages which were confined to the vestibular nucleus and were accompanied by adventitial changes similar to those noted in pigeons.

The observations are held not to support the thesis that vitamin B_1 has specific antidegenerative properties. —Alastair N. Worden.

I. Sealock, R. R., Livermore, A. H., & Evans, C. A. (1943). **Thiamine Inactivation by the Fresh-Fish or Chastek-Paralysis Factor.**—*J. Amer. chem. Soc.* **65.** 935–940. **147**

II. Long, J. B., & Shaw, J. N. (1943). **Chastek Paralysis Produced in Oregon Mink and Foxes by Feeding Fresh Frozen Smelt.**—*N. Amer. Vet.* **24.** 234–236. [Reprinted in *Amer. Fur Breed.* **15.** No. 11. 12–14. (1943)]. **148**

I. An attempt was made to isolate the principle in certain fresh fish-tissues which appears to destroy vitamin B_1 and so lead to the danger of Chastek paralysis in carnivores fed with large quantities of smelt, etc. [see Spitzer *et al.* and Green *et al.*—*V. B.* **12.** 462 & 507]. By *in vitro* tests, the principle was found to be present in most of the visceral tissues of the carp, the highest concentrations occurring in the spleen, liver, gastro-intestinal tract, and gills. By acetone treatment of these tissues, an active and stable dry powdered preparation was obtained. There were strong indications that the principle was of protein nature, and that it acted enzymatically.

II. During the summers of 1941 and 1942, numerous outbreaks of paralytic disease were reported on Oregon fur farms, particularly in mink. The disease was associated with the feeding of large quantities of Columbia River smelt, or eulachon (*Thaleichthys pacificus*), and experimental feeding demonstrated conclusively that this fish, when fed in the fresh frozen state to the extent of about 50% of the diet, produced typical Chastek paralysis in mink.

The symptomatology of the disease in mink was found to vary with age. Thus adult animals exhibited anorexia, weakness, emaciation and, in most cases, a diarrhoea in the last stages. Young mink, however, died suddenly. When preliminary symptoms were observed, rapid recovery could be brought about by intraperitoneal injection of 2 mg. of vitamin B_1, and such animals rapidly put on weight when provided with a diet free from smelt.—Alastair N. Worden.

Higgins, G. M., & Feldman, W. H. (1943). **Effect of Diet Low in Thiamine and Riboflavin on Avian Tuberculosis in Rats.**—*Amer. Rev. Tuberc.* **47.** 518–523. [Spanish summary]. **149**

Of 20 male Wistar rats which had attained individual body weights of 80 g., ten were provided with a standard laboratory diet containing 1·9 μg. of vitamin B_1 and 7·5 μg. of riboflavin per g., while the remaining ten were provided with a so-called "human diet" containing only 0·96 μg. of vitamin B_1 and 2·0 μg. of riboflavin per g. Eight weeks later every animal, then four months of age, was inoculated intravenously with a recently isolated avian strain of *Mycobacterium tuberculosis*, the estimated dose being 0·1 mg. of bacilli per 150 g. body weight.

Three animals in the deficient group died within a few weeks of inoculation, but owing to an oversight P.M. examinations were not made in these cases. Otherwise there was no difference in the response of the two groups.—Alastair N. Worden.

McDermott, W., Webster, B., Baker, R., Lockart, J., & Tompsett, R. (1943). **Nutritional Degeneration of the Optic Nerve in Rats: Its Relation to Tryparsamide Amblyopia.**—*J. Pharmacol.* **77.** 24–39. **150**

Degeneration of the optic nerve of rats was observed histologically when the animals had been fed upon a diet deficient in the vitamin B complex. Administration of tryparsamide intensified the degeneration. If the diet was supplemented with crystalline B vitamins (thiamine hydrochloride, riboflavin, nicotinic acid, pyridoxine, calcium pantothenate, and choline chloride), no degeneration, in the presence or absence of tryparsamide, was observed, thus showing that the absence of one of these substances is responsible for the effect. Pantothenic acid was proved not to be the one concerned. Deprivation of vitamin A caused optic nerve degeneration, together with other very marked symptoms, both in the presence and absence of tryparsamide. In partial vitamin A deprivation with tryparsamide administration, optic nerve degeneration preceded the onset of other symptoms, but no control experiment without tryparsamide was performed.—R. McAnally.

Briggs, G. M., Jr., Luckey, T. D., Teply, L. J., Elvehjem, C. A., & Hart, E. B. (1943). **Studies on Nicotinic Acid Deficiency in the Chick.**—*J. biol. Chem.* **148.** 517–522. **151**

Day-old chicks were fed on a nicotinic acid deficient ration containing 0·2–0·3 mg. nicotinic acid per 100 g. On this basal ration, growth and feather development were retarded and symptoms of chick blacktongue appeared. A scaly dermatitis also occurred in about 40% of the birds, which affected the legs and upper parts of the feet after the chicks had been on the diet for 2–3 weeks. The nicotinic acid and coenzyme I content of the tissues were markedly influenced by the nicotinic acid content of the ration. Chicks receiving the basal ration synthesized about one-sixth of their nicotinic acid requirements. The growth results obtained with succinyl sulphathiazole (which inhibits certain intestinal organisms) showed that, if intestinal synthesis of nicotinic acid takes place, only small amounts are produced. The administration of this substance did, however, reduce the amount of nicotinic acid synthesized. Several esters of nicotinic acid were found to have partial nicotinic acid activity, which varied with the length of the carbon side chain. Since the chick's requirement is low compared with the amount present in most foodstuffs, a deficiency is not likely to occur in practice, though it may possibly do so on poorly balanced rations deficient in other factors of the vitamin B complex.—E. M. Cruickshank.

Welch, A. D., & Wright, L. D. (1943). **The Rôle of "Folic Acid" and Biotin in the Nutrition of the Rat.**—*J. Nutrit.* **25.** 555–570. **152**

Sulphathiazole, when incorporated at a 5–10% level in a complete diet of natural foodstuffs, caused no demonstrable effect on the growth rate of rats, and there was no evidence of pathological changes in the tissues. When, however, 1–2% of sulphathiazole was added to purified rations complete in regard to known essential factors, marked inhibition of growth resulted. Other effects included alopecia, "spectacled" eyes and panophthalmitis, porphyrin-caked whiskers, and achromotrichia. A concentrate of "folic acid" from powdered grass plus a biotin concentrate or crystalline biotin produced a marked stimulation of growth when administered by stomach tube daily to rats which had reached a plateau in their growth rate on a synthetic diet containing 2% sulphathiazole. Rats receiving the basal ration plus sulphathiazole for several weeks showed a definite prolongation of prothrombin time which was markedly decreased by administration of either biotin or "folic acid". A combination of the two factors

restored the prothrombin time to the value found in animals given a grass juice supplement high in vitamin K and, in addition, exerted a favourable effect on the condition of the rats. The relationship of " folic acid " and biotin to bacterial activity in the intestine is discussed.—E. M. CRUICKSHANK.

VAN WAGTENDONK, W. J., & WULZEN, R. (1943). **A Dietary Factor, Essential for Guinea Pigs. I. Isolation from Raw Cream.**—*Arch. Biochem.* **1.** 373–377. **153**

WULZEN and co-workers have previously described a deficiency syndrome which appears in g. pigs receiving diets consisting largely of grain, but lacking in fresh green foods, and with added known vitamins. The symptoms could be cured rapidly by feeding 1 g. of raw cream daily, and the present paper describes the isolation from cream of what is apparently the active compound, a substance having a molecular weight of about 200 and containing a carbonyl group.—A. N. W.

KING, C. G. (1942). **Some Specific Physiological Disturbances Induced by Marginal Vitamin Deficiencies (C and B_1).**—*Fed. Proc. Amer. Soc. exp. Biol.* **1.** 293–296. **154**

The necessity for ascertaining the kind of disturbances which arise from moderate degrees of malnutrition, as apart from gross deficiencies, is stressed. Animals on a low intake of vitamin B_1 and other factors of the vitamin B complex have been found to be very sensitive to convulsive seizures when subjected to the noise of an electric buzzer. This suggests that studies of this nature in man may prove of value by indicating how the effects of strain and excessive noise in industrial workers may be alleviated. Vitamin C plays a regulatory role in a great variety of enzyme systems in the body, but is not stored there to any extent. Gross symptoms of vitamin C deficiency are observed in man only after a considerable period of low intake of the vitamin, but chemical and histological studies in g. pigs have shown that significant changes in the tissues, particularly the teeth and bones, take place within a short period. Other metabolic changes which appear with the onset of the deficiency are increased respiration, lowered sugar tolerance, and an alteration in nitrogen clearance. Especially important is the fact that lowered intake of the vitamin deprives the tissues of their normal resistance and injuries such as poisoning and infection cause excessive loss of the limited stores of vitamin C which are available. Experiments with g. pigs receiving 0·5 mg. of vitamin C daily and injected with diphtheria toxin showed that the adrenals, pancreas, and kidneys had lost 36, 38 and 22% respectively of their vitamin content as compared with the organs of control animals. Decreased intake of ascorbic acid has been found to render g. pigs more susceptible to the effects of barbiturates.—E. M. CRUICKSHANK.

KNODT, C. B., SHAW, J. C., & WHITE, G. C. (1942). **Studies on Ketosis in Dairy Cattle. I. Effect of Stall and Pasture Feeding upon the Concentration of Blood and Urinary Acetone Bodies of Dairy Cattle. II. Blood and Urinary Acetone Bodies of Dairy Cattle in Relation to Parturition, Lactation, Gestation, and Breed. III. Blood and Urinary Acetone Bodies as Related to Age.**—*J. Dairy Sci.* **25.** 837–849, 851–860 & 861–867. **155**

I. Blood and urine analyses for acetone, acetoacetic acid, and β-hydroxybutyric acid were made at monthly intervals on 11 mature cows over a period of a year. Total blood ketones increased from about 2·5 mg. % at the beginning of stall feeding, which included silage, to about 4 mg. % in late winter ; values fell again to about 2·0 mg. % when the cows were returned to pasture. Observations on a bull kept under identical conditions during the same period showed similar variations in ketone bodies, while four heifers pasture-fed in summer and hay-fed in winter showed much lower values for blood acetone bodies during the latter period. It was observed that blood ketone levels increased after feeding, reaching a maximum in three hours and gradually declining to pre-feeding level within nine hours ; this increase was especially marked when old grass silage was fed. It is concluded that the general increase in ketones observed during stall feeding in these animals was due chiefly to the feeding of old grass silage although it is not suggested that clinical acetonaemia is produced by such feeding.

[The variations recorded are very small in comparison with those observed by EDEN & GREEN—*V. B.* **11.** 265, and all can be regarded as falling within the normal range for any period of the year.]

II. The urine and blood ketone levels of 11 cows showed a very slight decrease as lactation advanced. Observations on several cows showed large day to day variations prior to, and following, calving, but generally a decrease in blood acetone bodies occurred during the two days after parturition. No significant variation in ketones occurred during gestation nor did cessation of milking cause any increase in blood ketones, a result which might have been expected because of large mobilization of acetone bodies for milk secretion purposes. In general, factors such as stage of lactation, parturition, gestation, cessation of milking, and breed do not exert much influence on the level of blood and urine ketones in the normal dairy cow.

Sixteen samples of blood, milk, and urine, taken at the same time, gave average values for total ketones of 3·2, 1·8 and 12 mg. % respectively. Aceto-acetic acid plus acetone formed the larger part of the total acetone bodies of milk. 427 samples obtained from 16 cows over a period of 15 months showed a significant correlation between blood and urine levels of total ketones, acetone plus aceto-acetic acid, and β-hydroxybutyric acid, the latter forming about 60% of the total acetone bodies in both blood and urine.

III. In order to investigate whether rumenal digestion was a possible factor in the production of acetone bodies, the blood and urine ketone values of calves were studied from birth to about ten months of age, that is, during the period of development of the rumen to the adult form. Blood and urine values were quite low for the first two months (about 1·5 mg. % and 9 mg. % respectively), followed by a progressive increase, extending over the entire period, to 2·0 mg. % and 15 mg. % respectively. The blood acetone bodies of the young calves were predominantly acetone and aceto-acetic acid, whereas in older animals β-hydroxybutyric acid formed the larger percentage. Five heifers initially 9–15 months old were studied over the period of a year, and, contrary to what is usually found in adult animals, they exhibited higher serum acetone values when at pasture than when winter-fed on hay and grain. Most of the fluctuations in total urine ketone values were due to variation in β-hydroxybutyric acid.

As the gradual increase in acetone bodies of the calf appears to parallel roughly the development of the rumen, it is suggested that the rumen may be responsible for the relatively large concentration of acetone bodies in the blood and urine of the bovine animal, but it is pointed out that the concurrent decrease in the level of liver glycogen and blood sugar during the early growth period may be more directly associated with the increase.—ALEX. B. PATERSON.

FORBES, R. M. (1943). **Ketosis in Ruminants.**—*Cornell Vet.* **33.** 27–47. **156**

Investigations regarding the aetiology of ketosis were carried out from the three following aspects. (1) Effect of readily available carbohydrate in the ration. For this two groups of ten cows were used ; one group received normal rations and the other normal rations plus corn sugar or molasses. (2) Occurrence of a diurnal variation in ketone levels in blood and urine in eight cows. (3) Experimental production of a fasting ketosis ; for this three goats and eight cows were used. Negative results were obtained by the first two methods ; the only animals which showed a rise in ketone levels were those receiving carbohydrate supplements. In the third group, blood and urine ketone levels were studied in late pregnancy and early and late lactation with animals on full rations and rations deficient in carbohydrate. Pregnant goats on the former ration showed total serum acetone values of about 3 mg. % and of 15 mg. % on the latter ration. Similar differences were observed in the early lactation period, but not in the late milking period. Analogous results were obtained with cows studied under similar experimental conditions, total serum acetone rising from about 3 mg. % on normal rations to 10 mg. % on the carbohydrate-deficient ration. Although none of the animals showed any of the typical symptoms of clinical acetonaemia, F. believes that the latter is caused primarily by deficient caloric intake which results from a lack of appetite produced by some primary disturbance caused by a definite infection, by metabolic disorders of functional origin, or by poor feeding practices. This deficient intake is most likely to occur in the cow during early lactation and, to a lesser extent, in late pregnancy (during which goats and sheep are most susceptible) because of imperfect adaptation to the great strain of milk production and the negative mineral, nitrogen, and energy balances associated with its onset.—Alex. B. Paterson.

See also absts. **278** (vitamin D), **99** (B vitamins and sarcoma growth), **107** (B complex), **116** (Ca metabolism), **211** (effect of sulphonamides on growth).

PHYSIOLOGY AND ANATOMY

Wolf, A., Kabat, E. A., & Newman, W. (1943). **Histochemical Studies on Tissue Enzymes. III. A Study of the Distribution of Acid Phosphatases with Special Reference to the Nervous System.**—*Amer. J. Path.* **19.** 423–439. **157**

The authors examined various normal and neoplastic tissues in man for the presence of acid phosphatase, using a modification of Gomori's histochemical method. Large amounts of acid phosphatase were found in the nervous system, male and female genital organs, and parts of the digestive, haemopoietic, urinary and endocrine systems. The enzyme was in greatest concentration in nuclei and it is suggested that it may play a part in nuclear metabolism. In tumours of the central nervous system, the phosphatase content was correlated with the enzyme content of the cell types giving origin to the various varieties of tumour.

—E. G. White.

Kleiber, M., Smith, A. H., & Levy, P. (1943). **Lactation Activity, Chemical Composition, and *in vitro* Metabolism of Rat Mammary Tissue.**—*Proc. Soc. exp. Biol., N.Y.* **53.** 94–96. **158**

The lactation activity, composition, and metabolic rate of rat mammary tissue were studied at the end of pregnancy and during lactation. Lactation increased very considerably the water content of the tissue, and the dry matter at the height of lactation had over seven times as much nitrogen per unit weight as the dry matter of the non-lactating gland. Lactation did not affect the metabolic rate per unit of fresh tissue *in vitro*, but it increased the metabolic rate per unit of dry matter threefold by the 21st day and decreased by a third the metabolic rate per unit of nitrogen in the tissue. A positive correlation was indicated between intensity of lactation and the magnitude of the effect that lactation has on the composition and metabolic rate of mammary tissue.—Alfred T. Cowie.

Ryshkov, V. P. (1941). Potreblenie i vydelenie vody loshad'yu pri podderzhivayushchem kormlenii i golodanii. [**Water Metabolism and Elimination by Horses Fasting and on Normal Diets**].—*Veterinariya, Moscow.* No. 3. pp. 112–116. [French summary] **159**

Experiments were made on three horses. It was found that under identical conditions of feeding and maintenance, the water consumption was different in the three horses observed, varying from 6·45–18·41 litres. No relation could be established between intake of water and body surface as was reported by Richter & Brayley in growing rats ; also no relation was found between water and food intakes. During fasting, a sharp decrease in water consumption was observed.

The excretion of urine while the animals were on a normal diet varied from 1·95–4·92 litres ; this excretion increased during fasting in spite of a decreased water intake ; this is suggested as being due to disintegration of body fats. The specific gravity of the urine during feeding averaged 1·055 and during fasting it fell to 1·019.

No sharp differences were observed in the water elimination with the faeces, which averaged 6·3–7·6 litres in normal animals during 24 hours. During fasting, the elimination of water was diminished in proportion to the diminished faeces. The moisture of the faeces during normal feeding averaged 70% and during fasting decreased up to the fourth day and subsequently rose again.—A. Moldawsky.

Morton, M. E., Chaikoff, I. L., Reinhardt, W. O., & Anderson, E. (1943). **Radioactive Iodine as an Indicator of the Metabolism of Iodine. VI. The Formation of Thyroxine and Diiodotyrosine by the Completely Thyroidectomized Animal.**—*J. biol. Chem.* **147.** 757–769. **160**

Isotonic sodium chloride solution containing tracer amounts of radio-active iodide was injected intraperitoneally into thyroidectomized rats which had been maintained for 2–6 months since the operation. After 96 hours, 20% of the radio-active iodine present in the intestines and liver was found to be organically bound as diiodotyrosine and 8% as thyroxine. In blood plasma and muscle, the proportions were smaller, and, in all tissues, the largest fraction of radio-active iodine still remained in the inorganic form.

The identities of the radio-active thyroxine and radio-active diiodotyrosine fractions from the tissues were established by the constancy of the radio-activity per unit weight when the fractions were recrystallized repeatedly with non-radioactive thyroxine and non-radioactive diiodotyrosine respectively. The completeness of thyroidectomy was established (a) by histological examination, and (b) by the absence of iodine-concentrating tissue in the neck and mediastinal regions. Hypophysectomy of thyroidectomized rats also failed to affect the conversion of radio-active iodine to diiodotyrosine and thyroxine. Studies are in progress to determine the tissues involved in the formation of

thyroxine and diiodotyrosine in thyroidectomized rats. —W. R. Muir.

Krzywanek, F. W., & Bründl, A. (1942). Untersuchungen über den Einfluss des Insulins auf den Blutzucker von Schweinen. [**Influence of Insulin on Blood Sugar of Swine**].—*Arch. wiss. prakt. Tierheilk.* **78.** 173–185. **161**

Alterations in the blood sugar of four young female pigs were determined after injection of various amounts of insulin. The normal values found were 67·5–81·5 mg. %. Hypoglycaemic shock occurred when the value fell to about 20 mg. %. This was produced by doses ranging from 80–200 units of insulin, or 0·91–1·94 units per kg. The severity and duration of the shock was similarly very dependent upon the individual constitution of the animal.—J. G. Carr.

Greenfield, I. (1941). **The Effect of the Intravenous Administration of Phosphate Solution in Normal Rabbits.**—*J. Lab. clin. Med.* **27.** 68–70. **162**

Six young chinchilla rabbits were injected intravenously with a phosphate solution at pH 7·4, containing 1 g. of monosodium phosphate and 4 g. of disodium phosphate in 45 ml. of distilled water. The concentrations of serum P and urine P rose sharply in the first hour after the phosphate injection and then fell during the second hour. Conversely, in the same periods, the serum and urine Ca levels decreased and then made a secondary rise, but, in no instance, were the initial values for Ca and P regained within the four-hour period of observations.

The serum Ca values did not fall to the level usually associated with low Ca tetany, but convulsive seizures were noted in two rabbits and five tremors in one. Nevertheless, all animals survived the injection experiments and were alive six months later. The results indicate that relatively large amounts of phosphate, 0·463 g. of sodium phosphate per kg. body weight, can be administered intravenously without disturbing the acid-base balance of the blood. References are made to the use of phosphate therapy in the treatment of experimental and industrial plumbism. —W. R. Muir.

Robscheit-Robbins, F. S., Miller, L. L., & Whipple, G. H. (1943). **Hemoglobin and Plasma Protein. Simultaneous Production during Continued Bleeding as Influenced by Amino Acids, Plasma, Hemoglobin, and Digests of Serum, Hemoglobin, and Casein.**—*J. exp. Med.* **77.** 375–396. **163**

Dogs which had been kept continuously for some time on a low protein but abundant iron diet were bled, thus depleting their haemoglobin and plasma protein and producing the stimulus to form both these proteins. When proteins (plasma, haemoglobin), protein digests (digest of serum, haemoglobin and casein), and amino-acid mixtures were then given, in some cases intravenously and in others intraperitoneally or by the mouth, measurement of the total haemoglobin and plasma proteins showed that these proteins were produced from all the test substances. In all cases there was greater production of haemoglobin than plasma protein. A mixture of the amino acids necessary for growth favoured haemoglobin formation more than any of the other substances tested.

These results suggest that protein digests might be used as a substitute for plasma or whole blood in clinical practice.—R. McAnally.

Nichols, R. E. (1942). **A Study of the Phenomenon of Erythrocyte Sedimentation. I. A Critical Survey of Literature. II. The Establishment of a Reliable Measurement of the Phenomenon—Its Reproducibility and Limitations. III. Anticoagulation as a Technical Source of Variations. IV. Venous Stasis, Delay, Temperature of Sample, Containers, Agitation, and Quantity of Formed Elements as Sources of Technical Variations.**—*J. Lab. clin. Med.* **27.** 1317–1327, 1410–1422 & 1569–1582; **28.** 75–88. **164**

I. A condensed review based on 347 references to the relevant literature. The factors which may effect the phenomenon of erythrocyte sedimentation are discussed under six headings, *viz*, physical, chemical, constancy of results, physiological, technical and pathological. It seems agreed that the following factors definitely operate :– changes in any of the physical or chemical properties of cells or plasma; movement of plasma; size of cell aggregates; rouleaux formation; temperature; protein composition of the blood; sex; pregnancy; venous stasis; nature and probably amount of anticoagulant; delay in measurement; perpendicularity of the tube and type of tube in which the phenomenon is measured; and, on the basis of limited reports, excitement of the subject and atmospheric conditions.

Differences of opinion exist as to the influence of :– changes in viscosity; changes in haemoglobin content; variations in O_2 and CO_2 content; pH; menstruation; age; exercise; time of day at which the measurement is made, and methods of expression. N. is cautious in interpreting the recorded data on the effect of cholesterol and lecithin, and on a variety of other physical forces and chemical factors. It seems to be agreed that tests on arterial, capillary, and venous blood agree, and that ingestion of food and sweating are without influence on the phenomenon.

Pathological factors are dismissed with the statement that "alteration of the phenomenon portrays metabolic changes—the result of nonspecific destructive disease."

II. A full description is given, both of an elaborate photographic technique, and of a more practical "field" technique suitable for use by practitioners. The description of the photographic technique is lengthy and detailed, and the original should be consulted by interested workers. In the field technique, the samples are collected into tubes, containing the anticoagulant mixture advocated in III, and allowed to stand at room temperature until the blood is settled. They are then shaken mechanically for 15 min., transferred to Wintrobe tubes, and placed in a perpendicular tube rack. The line of demarcation between cells and plasma is read five minutes after filling, and at 5-min. intervals until the maximum sedimentation is passed. The greatest difference (in mm.) between any two consecutive 5-min. readings is recorded, and ${}^{t}M_5$ and ${}^{L}M_5$ are determined. ${}^{t}M_5$ symbolizes the time in minutes between t_o–t_o at which M_5 (the maximum difference between any two consecutive 5 min. readings) occurs, and ${}^{L}M_5$ is equivalent to the angle opposite the horizontal side of a right-angled triangle having M_5 as the perpendicular side and 15 mm. as the horizontal. With these three points, it is considered possible to locate approximately the point of change between increasing and decreasing rate of descent of the line of demarcation between cells and plasma, and the speed of separation.

III. Defibrinated samples of equine blood gave a slower sedimentation rate than did those with added anticoagulants, but the discrepancy was less when the process of defibrination caused minimal cell damage and the plasma was not reddish. With potassium, sodium, and lithium oxalates and citrates the volume percentages tended to decrease as the amount of anticoagulant was increased, but a reverse effect was obtained with ammonium oxalate or citrate. Heparin, or a mixture of six parts of ammonium oxalate and four parts of potassium oxalate, were the most satisfactory anti-

coagulants, and in practice it is advocated that 10 mg. of the oxalate mixture be used for 5 ml. samples of blood. Sodium fluoride appeared to be unsuitable for equine blood.

IV. The control of the sources of technical variations indicated in the title is discussed. For free flow of blood without venous stasis at least a no. 10 gauge needle, or, better, a fair-sized cannula, is advocated but repeated bleeding with a needle of this size is not advised, and an alternative method is the use of a 50 ml. glass syringe with a no. 15 gauge 2-in. needle. Thumb pressure on the vein should be avoided. With the anti-coagulant mixture advocated in III, tests should be run within two hours of drawing the sample. Attempts should not be made to compare samples tested at different temperatures, but there seems to be little evidence that it is better to carry out the tests at body temperature than at room temperature, or *vice versa*. Containers giving blood columns of 100 × 6, 100 × 3, or 200 × 3 mm. were all satisfactory, but erratic results were obtained with tubes giving a column of 200 × 2 mm., and this is attributed to difficulty in filling. The technique of agitation and tube-filling advocated in II appears to be fairly dependable. Rouleaux formation occurs extremely readily in equine blood, and FAHRAEUS is quoted [(1921). *Acta med. Scand.* **55.** 1.] as stating that close examination of the finer vessels of the mesentery of the horse reveals that the corpuscles are so strongly aggregated that they do not separate during flowing. N. doubts whether F.'s observations on exposed mesentery can be taken as evidence that a certain degree of aggregation occurs intravascularly in the healthy horse.

The paper closes with a theoretical discussion on the relationship between the quantity of formed material and the rate at which this material separates out.

—ALASTAIR N. WORDEN.

ÅBERG, M. (1942). **The Reticulocytes at the Formation of Rouleaux and the Sedimentation Reaction.**—*Acta med. scand.* **111.** 555–565. **165**

It is possible to divide reticulocytes into four classes, according to the amount and distribution of the cresyl-blue staining material which they contain. At one extreme are cells with a compact nucleus-like mass, usually centrally placed; the second class contains a compact coarse network; the third class shows scattered rods and dots, and the fourth class has occasional fine dots, mainly around the periphery. Å. gives figures for the relative proportion of these four classes of reticulocytes and suggests that the last two classes are of considerable importance in rouleaux formation and in sedimentation, whereas the first two types play little part and sediment much more slowly. Å. relates these differences to the shape of the cells of the various classes. [In some places the text is very difficult to understand, owing to certain errors in the English construction.]—E. G. WHITE.

AGGELER, P. M., LUCIA, S. P., & HAMLIN, L. M. (1942). **Blood Clot Retraction. I. Measurement of the Extracorpuscular Volume of the Clot.**—*J. Lab. clin. Med.* **28.** 89–97. **166**

Measurement of the extracorpuscular volume of the clot is recommended as a means of assessing the efficiency of blood clot retraction. This extracorpuscular volume is defined and measured by the difference between the volume of the clot, expressed as a percentage of the total volume of the coagulated blood sample, and the volume of the centrifugally packed cells, expressed as a percentage of the volume of the whole blood sample. The laboratory procedure is described and is said to possess an inherent error of 5%. The method takes into account the effect of the volume of the cells upon the volume of the clot and the importance of giving consideration to this effect is indicated.

Observations on blood specimens from normal human beings and from patients with certain blood disorders are recorded. Values for the extracorpuscular volume of the clot fell outside the normal range in only 13 out of 42 patients with hypoprothrombinaemia, whereas clot retraction was deficient in 30 out of 35 patients with thrombocytopenia. Factors influencing the degree of blood clot retraction are discussed.

—W. R. MUIR.

MAEGRAITH, B. G., MARTIN, N. H., & FINDLAY, G. M. (1943). **The Mechanism of Red Blood Cell Destruction.**—*Brit. J. exp. Path.* **24.** 58–65. **167**

In investigations on the mechanism of erythrocyte destruction, in which g. pigs and monkeys were used, it was found that red blood corpuscles are lysed when incubated at 37°C. in the presence of washed tissue from the same animal. This lysis is species specific; the lytic agent is probably an enzyme, and the time relations of the lysis suggest this, since the process takes place slowly at first, then increases its speed and slows down again. Heating the tissues at 80°C. destroys the lytic agent and lysis is inhibited by traces of potassium cyanide and low concentrations of mercuric chloride. The lysis can be inhibited by titrable concentrations of serum from the same or other species.

It is suggested that normal r.b.c. destruction depends on a balance between the lytic agent in the tissues and the inhibitor content of the serum and tissues.—D. L. HUGHES.

JAPA, J. (1943). **A Study of the Morphology and Development of the Megakaryocytes.**—*Brit. J. exp. Path.* **24.** 73–80. **168**

There is a considerable difference of opinion in the literature as to the nature and development of the megakaryocytes in the bone marrow. Using the squash method of preparation and fixing and staining with aceto-carmine, J. re-examined the problem. It was found that the megakaryocytes are multinucleated cells developing by repeated, normal mitotic division of their nuclei without cytoplasmic division. Nuclear division takes place synchronously, but independently, with separate chromosome complexes each with its own spindle mechanism.

Five classes of cells were seen, according to the number of nuclei in the cell, *viz*, 2, 4, 8, 16, and 32 nuclei. Degeneration was not seen in cells with less than eight nuclei.—D. L. HUGHES.

DILLS, W. L., & NELSON, J. M. (1942). **Isolation of a Copper Bearing Protein from Cow's Milk.**—*J. Amer. chem. Soc.* **64.** 1616–1618. **169**

A method is described for isolating from milk a protein containing about 0·19% Cu and 15% N. Dialysis experiments showed that the Cu in this protein was non-ionic and could not be removed by dialysis at pH 6·5. So far no chemical reactions have been found which are catalysed by this milk protein.—R. ALLCROFT.

I. FARNER, D. S. (1942). **The Hydrogen Ion Concentration in Avian Digestive Tracts.**—*Poult. Sci.* **21.** 445–450. **170**

II. FARNER, D. S. (1943). **Gastric Hydrogen Ion Concentration and Acidity in the Domestic Fowl.**—*Ibid.* **22.** 79–82. **171**

I. The results are described of work undertaken to determine the pH in the various portions of the digestive tract of chickens, pigeons, ducks, pheasants, and turkeys. The samples were taken from birds immediately after they had been killed.

II. Experiments were made on 22 domestic fowls. It was possible to obtain 10 ml. of gizzard fluid from the live unanaesthetized bird by means of a spinal puncture needle with trochar and a 20 ml. syringe.

The mean pH in the 22 birds was 2·05 which is higher than that of gizzard fluid from freshly killed birds. It was also noted that the pH tended to be higher in the daytime than at night.—J. D. BLAXLAND.

*TONARELLI, A. (1941). Rilievi semeiotici negli ovini. 1. Frequenza respiratoria. 2. Frequenza circolatoria. **[Symptomatology in the Sheep. 1. Respiratory Rate. 2. Circulatory Rate].**—*Nuova Vet.* **19.** 160–166 & 179–183. [Abst. from abst. in *Jber. Vet. Med.* **69.** 551]. **172**

I. Studies of the respiratory rate were made on 367 female and 58 male sheep. Average values at various ages were :– 1 month, 48 ; 1 month to 1 year, 30 ; 1–7 years, 21 ; over 7 years, 19. At an environmental temperature of 7°C. the rate was 25, at 11°C., 30, and at 21°C., 38. Before pasturing it was 23–27, and after, 25–32. The rate varied inversely with the haemoglobin index. At 12 m. above sea level the rate was 23, at 1,500 m. it was 27. Exercise caused an increase from the resting values of 29–32 to 47–60. [No further details given in abst. concerning age differences.] There was a sex difference in the rate of 1–5. It was highest at 1 hour, similar at 6 and 23 hours, with a rise at 12 and 19 hours.

II. Studies were made on 364 female and 53 male sheep. The following ranges were found :– 1 month, 136–220 ; 5 months, 86–104 ; 8 months, 82–92 ; 1 year, 72–90 ; 2 years, 72–96 ; 3 years, 72–92 ; 4 years, 56–84 ; 5 years, 74–80 ; 6 years, 72–80 ; 7 years, 72–80 ; 8 years, 72–82 ; 9 years, 64–90. Adults with body temperatures of 38·6–39·5°C., 60–82·2 ; lambs with temperatures of 39·1–39·8°C., 148–166·8. Young sheep with temperatures of 39·1–40·2°C., 86–96 ; adults with the same temperatures, 72·5–83. Average values for females were slightly higher than those for males. The rate was lowest at 5 hours, and highest at 18 hours. No variations could be attributed to altitude, atmospheric pressure, body position, sleep, feeding, or body size. In stall-fed animals in winter, there was an increase. Environmental temperature caused an alteration in the rate, from 75·5 at 3°C. to 79·8 at 12°C., 82·2 at 21°C., and 83·1 at 25°C.—J. G. CARR.

FRIEDEMANN, U. (1943). **Selective Permeability of Skin Capillaries.**—*Proc. Soc. exp. Biol., N.Y.* **53.** 139–141. **173**

The permeability of the cerebral capillaries to basic and acid dyes was studied by injection into the abdominal lymph sac in intact frogs. Both acid and basic dyes were able to pass through the cerebral capillaries, whereas in the rabbit and g. pig the cerebral capillaries are selectively permeable to basic dyes.

The permeability of the capillaries of other organs in g. pigs was studied by intravenous injection of 1% solutions of a variety of basic and acid aniline dyes and by *in vitro* experiments with small pieces of freshly excised abdominal skin. Muscles, epidermis, lungs, liver, kidneys, and adrenals were stained by both acid and basic dyes, but the inner surface of the abdominal skin was selectively stained by acid dyes. It is stated that the permeability of capillaries to dyes is independent of the colloid or non-colloid nature of the latter and the electrical charge appears to be the decisive factor. F. concludes that in mammals both the cerebral and skin capillaries (probably also connective tissue capillaries in general) have a selective permeability to polar substances, the former to acid dyes and the latter to basic dyes.—E. G. WHITE.

GRANICK, S. (1943). **Non-Hematin Iron in Erythrocytes.**—*Proc. Soc. exp. Biol., N.Y.* **53.** 255–256. **174**

A black colouration due to the precipitation of iron sulphide was obtained when tissues containing non-haematin iron, including ferritin, were treated with H_2S. The stain was seen, as fine black granules giving a general grey appearance, in cells which in some cases could be identified as erythrocytes in the bone marrow and spleen of the horse, and the spleen of the rabbit, g. pig, and man. It is suggested that inorganic iron was being set free from haemoglobin in degenerating erythrocytes.—R. MCANALLY.

GRANICK, S. (1942). **Ferritin. I. Physical and Chemical Properties of Horse Spleen Ferritin.**—*J. biol. Chem.* **146.** 451–461. **175**

GRANICK, S., & MICHAELIS, L. (1943). **Ferritin. II. Apoferritin of Horse Spleen.**—*Ibid.* **147.** 91–97. **176**

MICHAELIS, L., CORYELL, C. D., & GRANICK, S. (1943). **Ferritin. III. The Magnetic Properties of Ferritin and some other Colloidal Ferric Compounds.**—*Ibid.* **148.** 463–480. **177**

GRANICK, S. (1943). **Ferritin. IV. Occurrence and Immunological Properties of Ferritin.** — *Ibid.* **149.** 157–167. **178**

I. Ferritin, a non-haematin iron (20%) containing protein was isolated from horse spleen. It could be obtained as brown crystals by treating an extract of the spleen with cadmium sulphate and, since crystals were also seen when a piece of teased-out spleen was treated with cadmium sulphate without any previous treatment, the crystals obtained could not have been an artefact of the method of extraction.

Electrophoresis indicated that the product was homogeneous, but other physical properties (sedimentation in the ultracentrifuge, solubility) and the iron and phosphorus content of different samples indicated the reverse. The effect of heat and the nature of the crystals obtained with cadmium sulphate were studied.

II. When the ferric iron of ferritin was reduced to the ferrous state and then removed as an organic compound by dialysis, a homogeneous colourless protein, apoferritin, resulted which could be obtained in the same crystalline form as ferritin on treatment with cadmium sulphate. Ferritin was regenerated from apoferritin by treatment of the latter with the iron-containing mother liquor from precipitation (by cadmium sulphate) of ferritin crystals. It is suggested that in ferritin, micelles of a colloidal iron compound are loosely attached in the interstices of the apoferritin structure.

III. The electronic configuration of the iron atom in ferritin was studied by means of measurements of magnetic properties of ferritin and comparison with similar measurements for other iron compounds.

IV. Ferritin crystals were obtained from organs of a number of different species, including human beings, horses, pigs, dogs, and cats, but excluding cattle, sheep, and fowls. The organs from which ferritin has been isolated are the spleen, liver, bone marrow, kidneys, and testicle. An antibody towards horse-spleen apoferritin was produced in the rabbit, which gave a precipitin reaction with ferritin from other organs of the horse, but only a slight reaction towards dog apoferritin and none towards human apoferritin. Ferritin was detected by means of this precipitin reaction in the adrenals, pancreas, ovary, and lymph nodes of the horse, in addition to the organs listed above. There was none in blood, striated muscle, pituitary, or stomach mucosa. Spleens of horses which had been bled for serum production contained rather less ferritin than those of normal horses.—R. MCANALLY.

MULLIGAN, R. M. (1942). **Histological Studies on the**

Canine Female Genital Tract.—*J. Morph.* **71.** 431–448. **179**

A detailed account, illustrated by 22 figures, of the histological changes occurring in the ovaries, uterine cornua, and vagina of the bitch (52 mongrels) at various stages of the oestrous cycle, during pregnancy, and in the post-partum period. For the most part, the observations confirm the findings of other workers and the original article should be consulted by those interested.—E. G. White.

Gruenwald, P. (1943). **Developmental Basis of Regenerative and Pathologic Growth in the Uterus.** —*Arch. Path.* **35.** 53–65. **180**

This is one of a series of articles dealing with the embryonic development of the urogenital organs. Having studied serial sections of many human, mammalian, and chick embryos, G. stresses the intimate relations between the epithelial and mesenchymal constituents in the derivatives of the embryonic coelomic wall. Transitions between epithelial and non-epithelial components may be found during various stages of development up to the adult condition. Thus non-epithelial cells in the utero-vaginal canal may possess epithelial potencies and this may explain the reported regeneration of uterine epithelium, following menstruation, from the underlying stroma. In tumours arising from derivatives of the coelomic wall it may not always be possible to distinguish sharply between epithelial and non-epithelial structures. The origin of endometriosis by local differentiation is also explained by these observations.—E. G. White.

Morgan, B. B., & Whitehair, C. K. (1943). **The Hydrogen Ion Concentration of Bovine Fetal Fluids.** —*Cornell Vet.* **33.** 273–276. **181**

The pH of amniotic and allantoic fluids of normal cattle at various stages of gestation was determined. The amniotic fluid was alkaline up to the fifth month (pH 7·27–7·13) and became slightly acid in the remaining months (pH 6·96–6·86). The allantoic fluid was slightly alkaline in the 1st–3rd months (pH 7·27–7·09) and thereafter became acid (pH 6·81–6·05).—N. J. S.

Eaton, O. N. (1941). **Effect of Crossing Inbred Lines of Guinea Pigs.**—*Tech. Bull. U.S. Dep. Agric.* No. 765. pp. 19. **182**

The major part of this bulletin comprises a detailed analysis of cross-breeding experiments with g. pigs conducted by workers in the United States Bureau of Animal Industry. The data presented cover the period from 1st January, 1916 to 31st December, 1937. The object of the experiments was a comparison involving five inbred strains of g. pigs, a non-inbred control stock, and reciprocal crosses between the inbred strains, on the basis of various measures of fertility, growth, and mortality. The main conclusions arising from the analysis of the very extensive data are as follows. In crosses between strains of high and low fertility, the hybrid was usually higher in fertility than the poorer parent but lower than the better parent. The same relationship held for growth as for fertility. It was shown that mature-growth characteristics cannot be determined from weight at birth and weaning. In most cases, crossing the strains increased the viability. Reciprocal crosses varied in their performance. The dam appeared to affect the fertility and growth of the young more than did the sire. Mating took place somewhat more regularly when the sires and dams were unrelated, but there was little difference in the age at which first litters were born. Greater fertility and viability resulted from combining three inbred families (trihybridization) in a cross than from combining two. The performance of the hybrids cannot be predicted from the performance of their inbred parents.

The results in general seem consistent with the manifestations of heterosis as found in hybrid plants. E., in discussing the limited application of the results to livestock breeding, points out that the methods which have been applied so successfully to plant improvement are difficult to apply to the larger domesticated animals. —N. J. Scorgie.

Marshall, F. H. A., & Hammond, J. (1943). **Fertility and Animal Breeding.**—*Bull. Minist. Agric. Fish., Lond.* No. 39. pp. 42. [5th Edit.] [1s.] **183**

This publication gives a general account of the biology and of the elementary anatomy and physiology of reproduction in farm livestock and smaller domestic species. The scope of the subject matter is indicated in the following headings :– "The Male Generative System", "The Female Generative System", "Puberty", "Rut, Oestrus and the Sexual Cycle", "Fertility in Farm Animals", "Fertility in the Male Animal", "Artificial Insemination", "The Mare", "The Cow", etc. The sections dealing with the individual animals include information on the breeding season, duration and recognition of oestrus, mating procedure, duration of gestation, pregnancy diagnosis, and causes of infertility with indications for their treatment. The bulletin is written in simple, non-technical language and is intended primarily to give stockbreeders a proper understanding of the conditions governing the fertility of their animals.—N. J. Scorgie.

Phillips, R. W., Knapp, B., Jr., Heemstra, L. C., & Eaton, O. N. (1943). **Seasonal Variation in the Semen of Bulls.**—*Amer. J. vet. Res.* **4.** 115–119. **184**

Semen from three beef and three milking breed bulls was studied at intervals of two weeks throughout a year. Differences between the breed groups were significant in only two of the measures studied, but variations between bulls were significant or highly significant in all but one of the measures. Significant or highly significant differences were observed between seasons in six of the measures, *viz*, number of sperm per ml., total sperm, abnormal heads, abnormal necks, abnormal middle pieces, abnormal tails. The variation due to season was not significant in motility, volume, total abnormal sperm, or survival in storage. The volume of semen produced was highest in the winter and lowest in the summer. Total sperm produced was highest in the spring and lowest in the autumn. Abnormal heads, necks, and middle pieces were highest in the summer months and lowest in the winter, but abnormal tails were highest in the winter and lowest in the summer. Examination of results of 1,135 matings during the period 1935–42 revealed that the highest percentage of fertile matings occurred in April (59·6%) and the lowest in August (40·8%). It appears that the decrease noted in certain measures of semen quality during the summer months is reflected in decreased breeding efficiency in the herd.—N. J. Scorgie.

Phillips, R. W., Schott, R. G., Eaton, O. N., & Simmons, V. L. (1943). **Seasonal Variations in the Semen of Sheep and Goats.**—*Cornell Vet.* **33.** 227–235. **185**

Semen samples taken at intervals of two weeks throughout a year were obtained from 12 rams, and observations were made on motility, volume, number of sperm per ml., total sperm produced, the proportion of abnormal forms, and total abnormal sperm. Differences between seasons were found to be significant in all the items studied except volume. The rams within breeds differed significantly in all the characters studied, but the breed groups did not differ significantly in any

measure except the total number of sperm produced. The findings substantiate the results of earlier investigations which indicate that warm summer temperatures may be an important factor in reducing fertility in sheep. The data for goats were too limited to allow any conclusion to be drawn.—N. J. Scorgie.

Wheeler, N. C., & Andrews, F. N. (1943). **The Influence of Season on Semen Production in the Domestic Fowl.**—*Poult. Sci.* **22.** 361–367. **186**

The results of this investigation indicate that seasonal variations occur in semen quantity and quality, although the regulating mechanisms have not yet been experimentally demonstrated. With Barred Plymouth Rock males, the largest volumes of semen were produced between November and March, the concentration of sperm per c.mm. was greatest between May and August, and the total number of sperm per ejaculate showed a significant rise between December and April. There was no seasonal variation in pH, the average for 831 semen samples being 7·04, range 7·90–5·30. The average survival time of the sperm in storage at 2°–3°C. was 6·8 days ; sperm survived longest between November and March. No significant changes in semen production were observed in a group of six males kept in a heated house at 40°–46°F. The authors discuss the bearing of their results on the reported low fertility and hatchability of eggs during the late summer and early autumn and conclude that the male is at least partially responsible.—N. J. Scorgie.

Burrows, W. H., & Quinn, J. P. (1937). **The Collection of Spermatozoa from the Domestic Fowl and Turkey.**—*Poult. Sci.* **16.** 19–24. **187**

The method described is a modification of the authors' previous technique. Ejaculation is stimulated by rapid massage of the soft part of the abdomen between the gizzard and the pelvic bones ; stimulation can be augmented by rubbing the finger along the pygostyle. The procedure is to stimulate the bird until the copulatory organ is protruded ; the organ is then gripped between the finger and thumb and held exposed as long as the muscular contractions persist ; the bulbous ducts are now squeezed out and the organ released. A glass funnel, the stem of which is closed and fitted into a rubber stopper, is used for collection of the semen. The bird is further stimulated to make a second ejaculatory response, at which no semen will be ejected if the bulbous ducts have been properly milked ; it will usually be found, however, that following on the ejaculatory response, the ducts are full and semen can be obtained from them by squeezing. This procedure may be repeated up to 2–8 times at a single collection. In November, the individual total yields from different cocks ranged from 0·1–1·1 ml., and from December to June from 0·4–3·6 ml. ; in rare instances, 4·0 ml. was obtained at a single collection. The cock should be segregated for at least two days before collection of semen. All birds are more easily stimulated after they have been used for several collections. A detailed description of the genitalia of the male domestic fowl is given, in which it is pointed out that, contrary to popular belief, the bird has a copulatory organ of appreciable dimensions.—N. J. Scorgie.

Nalbandov, A., & Card, L. E. (1943). **Effect of Stale Sperm on Fertility and Hatchability of Chicken Eggs.**—*Poult. Sci.* **22.** 218–226. **188**

The method adopted to study the effect of stale (senescent) sperm was to remove the cocks from the hens in the mating pens, thus ensuring that the eggs laid on the days following separation were fertilized by progressively ageing sperm. The results show that senescent sperm retains its ability to fertilize eggs. With the increasing age of sperm, the proportion of eggs failing to hatch increases. No unusual quantitative embryo mortality occurs in eggs fertilized by sperm 1–10 days old (*i.e.* 1–10 days following copulation). Thereafter hatchability declines more rapidly than does fertility and embryo mortality soon exceeds hatchability so that eventually all fertile eggs die. There is a strong negative correlation between age of sperm and age of embryos at death. Dead embryos from eggs fertilized by fresh sperm died on the average on the 14th day of development, while eggs fertilized by sperm present in the oviduct for 1–10 days died at about 11 days of embryonic age. Eggs fertilized by sperm older than 11 days died at 1–5 days of development. Staleness of sperm did not increase the incidence of teratological conditions, nor did it alter the sex-ratio.

Discussing the results, the authors suggest that physiological changes in the sperm permit it to retain its ability to fertilize, but zygotes produced by stale sperm show a tendency to die earlier in embryonic development than do eggs fertilized by fresh sperm. The embryonic age-at-death distribution indicates that the effects of senescence on the sperm are progressive and gradual, and it seems that, with increasing age, the sperm cell contributes to the egg progressively less of the impetus necessary to carry the zygote to hatching. —N. J. Scorgie.

I. Lardy, H. A., & Phillips, P. H. (1943). **Inhibition of Sperm Respiration and Reversibility of the Effects of Metabolic Inhibitors.**—*J. biol. Chem.* **148.** 333–341. **189**

II. Lardy, H. A., & Phillips, P. H. (1943). **Inhibition of Sperm Glycolysis and Reversibility of the Effects of Metabolic Inhibitors.**—*Ibid.* 343–347. **190**

I. Malonate, benzoate, fluoride, and hydroquinone produced an inhibitory effect, which was largely reversible, on the respiration and motility of ejaculated bull sperm. Hydroxyquinoline sulphate reversibly inhibited O_2 consumption, but had no effect on motility. Indole, maleate, selenite, arsenite, *d,l*-glyceraldehyde, and quinone irreversibly inhibited both respiration and motility ; the effect of maleate on motility, however, in the presence of glucose was reversible. Cyanide and azide inhibited sperm respiration, indicating the importance of the cytochrome system in this process. Malonate, cyanide, and benzoate inhibited motility, but were relatively non-toxic in the presence of glucose. This is taken as evidence that both oxidative and glucolytic processes furnish energy for motility of bull sperm. In a sample of bull sperm with a low endogenous respiration, exposure of the sample to 0·00025 M *p*-phenylenediamine for 30 min. increased the respiration sixfold.

II. Malonate and benzoate at concentrations of 0·01 M did not inhibit sperm glycolysis. Cyanide, maleate and hydroquinone stimulated glycolysis ; the effect of cyanide only was reversible. Quinone and fluoride completely and reversibly inhibited lactic acid production and glycolysis respectively. Increasing of the Mg++ content of the suspension medium decreased the reversibility of fluoride inhibition, while pyruvate reversed fluoride inhibition of glycolysis but was ineffective in relieving fluoride inhibition of motility. In yolk-buffer, some specimens of bull sperm could be almost completely inactivated by fluoride for several days and upon transfer to fresh yolk buffer, vigorous motility was regained.—N. J. Scorgie.

Lardy, H. A., & Phillips, P. H. (1943). **Effect of pH and Certain Electrolytes on the Metabolism of Ejaculated Spermatozoa.**—*Amer. J. Physiol.* **138,** 741–746. **191**

Calcium-free Ringer-phosphate solution proved a very suitable medium for the study of the metabolism of ejaculated spermatozoa, provided precautions were taken to have the optimum pH for the species. The optimum pH values for the endogenous respiration of bull, cock, and rabbit spermatozoa were found to be 6·9–7·0, 7·25, and 6·8 respectively. Phosphate and potassium ions were of importance for the maintenance of glycolysis, respiration, and motility. Phosphate was apparently more important for glycolysis than for respiration, the most probable explanation for this being the buffering action of the phosphate, since in the absence of buffer salts, lactic acid produced by the spermatozoa rapidly brings the medium below pH 6 where survival is greatly impaired. Magnesium benefited motility and usually increased respiration, but had no consistent effect on glycolysis. Potassium stimulated while manganese and especially calcium definitely inhibited all three phenomena.—N. J. S.

LICHTY, D. L. (1943). **Chick-Embryo Diluter Versus Phosphate-Egg Yolk Buffer in Artificial Insemination of Cows : A Preliminary Report.**—*J. Amer. vet. med. Ass.* **103.** 99–101. **192**

Samples of semen from each of two bulls were diluted with chick-embryo solution and egg-yolk phosphate buffer. The semen of one bull when diluted with chick-embryo solution gave slightly better fertility results when used for insemination up to the third day after collection than when diluted with egg-yolk phosphate buffer. The reverse was true for the semen of the second bull. Differences were also observed in the motility and viability of the sperm of each of the bulls after storage in the different diluters for periods up to ten days.—N. J. SCORGIE.

DUNN, H. O., LEPARD, O. L., MURPHY, J. M., & GARRETT, O. F. (1942). **The Effect of Amphyl on Motility and Longevity of Bovine Spermatozoa.**—*J. Dairy Sci.* **25.** 1015–1021. **193**

Sterilization of artificial insemination equipment and glassware with amphyl, a disinfectant containing a mixture of *p*-chloro-symm.-*m*-dimethyl hydroxybenzene, *p*-tertiary-amyl hydroxybenzene, and neutral soap in solution containing 20% alcohol, 6·5% glycerol, and 34% water, had no harmful effect on the motility or longevity of sperm subsequently brought into contact with this equipment. Sperm suspended in egg-yolk plus phosphate buffer medium containing from 0·2–0·5% of amphyl maintained motility longer than sperm in the same medium without amphyl. Sperm in phosphate buffer solution containing 1% amphyl soon lost all motility. Sperm suspended in egg-yolk plus phosphate buffer containing 1% lysol lost all motility within three days, whereas sperm suspended in the same medium containing 1% zephiran remained motile for a period equal to that of the control sample. Haemolytic staphylococci were completely destroyed in phosphate buffer with 1% amphyl and in egg-yolk solution with 1% amphyl, but many of the staphylococci continued to grow after seven days when suspended in egg-yolk plus phosphate buffer solution containing 1% amphyl.

The authors can offer no satisfactory explanation of the behaviour of bovine sperm or of haemolytic staphylococci in the presence of amphyl, but it seems possible that the toxicity of the disinfectant toward sperm and bacteria is greatly reduced or completely nullified by ingredients present in egg-yolk plus phosphate buffer. It is suggested that this could probably take place through some type of chemical combination, perhaps between amphyl and egg-yolk in the presence of phosphates. The increased longevity and motility of the sperm, however, cannot be explained on this basis.—N. J. SCORGIE.

FOLLEY, S. J. (1942). **" Ghost " Formation in Subcutaneously Implanted Tablets of Synthetic Oestrogens.**—*Nature, Lond.* **150.** 403–404. **194**

It was observed that the absorption rate from tablets of diethylstilboestrol and hexoestrol, subcutaneously implanted into cattle, decreased with time at a greater rate than could be accounted for by the diminishing surface area of the tablet. Investigation showed that when such a tablet was removed from an animal and gently refluxed with alcohol or ether, it appeared to be insoluble, although it was evident that oestrogen was being extracted ; the tablet gradually assumed a yellowish translucent appearance and eventually began to float. The tablet then consisted of a fragile hollow body of the same shape as, and very little smaller than, the original tablet but composed of ether-alcohol insoluble material. The name " ghost " is proposed for this structure which is evidently formed *in vivo* by infiltration into, and deposition of tissue protein in, the pores of the surface zone of the tablet. Its presence is invisible to the naked eye until the oestrogen " skeleton " has been dissolved away.

This " ghost " formation may be of practical importance in two ways :– (1) failure to allow for the weight of the " ghost " in determining absorption rates by weighing the tablet before and after implantation may result in errors amounting to 10–20% ; (2) absorption may be considerably retarded by such an insoluble substance and may ultimately be stopped altogether. —R. ALLCROFT.

FOLLEY, S. J. (1943). **Tablet Absorption and Ghost Formation. [Correspondence].** — *Nature, Lond.* **152.** 134–135. **195**

Compressed hexoestrol tablets possess a labile fraction which is quickly lost on subcutaneous implantation or incubation with blood or distilled water. As a consequence of this labile fraction, absorption curves in cattle, goats, rabbits, rats, g. pigs, and pigeons show an initial phase of rapid absorption after which the curves bend sharply and absorption proceeds at a linear but reduced rate. This effect is most marked in the larger classes of tablet (250 mg. and upwards). It appears that it is the loss of this fraction which accounts for the reduced initial absorption on re-implantation and not the presence of a preformed " ghost " [see preceding abst.] in the tablet as was formerly believed. Absorption rates are proportional to the surface area of the tablets provided that the tablets are not too large in relation to the size of the animal. Whether " ghost " formation affects the linear absorption rate is not yet known.—ALFRED T. COWIE.

LEWIS, A. A., & TURNER, C. W. (1942). **The Effect of Stilbestrol and Anterior Pituitary Extract upon Lactation in Goats.**—*J. Dairy Sci.* **25.** 895–908. **196**

Prolonged and copious lactation can generally be induced in virgin and dry goats by administration of diethylstilboestrol. Comparing the effectiveness of various methods of administration of the oestrogen, 0·25 mg. diethylstilboestrol per day was found to be effective by subcutaneous injection ; percutaneous administration, using an alcoholic solution, required 16 times the injection dose ; when administered orally, 5 mg. per day proved ineffective, which may indicate that the oestrogen is destroyed in the rumen. Subcutaneous implantation of 100 mg. pellets of diethylstilboestrol dipropionate was the least laborious method and was quite effective.

Injections of anterior pituitary extract were effective in augmenting the milk yield or in initiating

lactation in oestrogen-treated goats. Lactogenic extract was less effective than extracts containing other pituitary factors. Cessation of oestrogen treatment when the milk yield had commenced to decline had frequently a beneficial effect. The administration of diethylstilboestrol and pituitary extract to a few goats in natural lactation had no beneficial effect on production. Two goats which received oestrogen treatment during the last half of pregnancy kidded normally. No adverse effects on growth, health, or future breeding history of the diethylstilboestrol-treated goats were observed. [See also Folley *et al.*—*V. B.* **12.** 550.]—A. T. C.

Biskind, G. R., & Meyer, M. A. (1943). **Inactivation of Estrone in Normal Male Rabbits.**—*Proc. Soc. exp. Biol., N. Y.* **53.** 91–94. **197**

Two groups each of three young male rabbits were implanted with oestrone pellets subcutaneously and in the spleen respectively; after 91 days the testicles were weighed and examined histologically. The weights of the testicles of the spleen-implanted group were of the same order of magnitude as those from a group of three controls, whereas the testicles from the rabbits implanted subcutaneously with oestrone weighed only a sixth as much and showed degenerative changes of a similar nature to those produced by experimental cryptorchidism in the rabbit. From these results it is concluded that the liver of the normal male rabbit is capable of inactivating oestrone.—Alfred T. Cowie.

Hurst, V., Meites, J., & Turner, C. W. (1943). **Lactogenic Hormone Content of the AP of the Pigeon.**—*Proc. Soc. exp. Biol., N.Y.* **53.** 89–91. **198**

Anterior pituitaries of common and White King pigeons were assayed for lactogen; the pituitaries from the females contained 0·02–0·04 I.U. lactogen per mg., whereas the males had $\frac{1}{2}$–$\frac{1}{3}$ this amount of lactogen, although the males take part in the incubation of the eggs and in feeding the chicks. Per 100 g. body weight, the pituitary of the White King contained only $\frac{1}{4}$–$\frac{2}{3}$ as much lactogen as that of the common pigeon.—A. T. C.

Astwood, E. B. (1943). **The Chemical Nature of Compounds which Inhibit the Function of the Thyroid Gland.**—*J. Pharmacol.* **78.** 79–89. **199**

To test their power of inhibiting the formation and secretion of thyroid hormone, 106 chemical compounds were administered to young rats, in the drinking water if soluble and with the food if insoluble. The magnitude of the effect was assessed by the degree of hyperplasia of the thyroid gland caused by each substance. A gross visual estimate of hyperplasia was first made and then the glands were fixed in formalin and paraffin sections were stained with haemotoxylin and eosin. Final grading of the degree of hyperplasia was made by observation of colloid loss and of enlargement and proliferation of acinar cells in the sections. The members of one series of active substances were derivatives of thiourea, having the –NH.CS.NH– group in common. Both the sulphur atom and the two amino groups appeared to be essential for activity. 2-thiouracil and 2-thiobarbituric appeared to be most suitable for possible clinical use on account of their high activity and non-toxicity. Another series of active compounds, which included the sulphonamides, had the aniline grouping in common. Large doses of iodine given with the substances of the thiourea or aniline series did not modify the effect, but enlargement of the thyroid gland caused by thiocyanates was not shown when iodine was also given.—R. McAnally.

Barron, D. H. (1943). **The Early Development of the Motor Cells and Columns in the Spinal Cord of the Sheep.**—*J. comp. Neurol.* **78.** 1–27. **200**

The development of the motor cell columns in the anterior cervical and brachial segments of the spinal cord was studied in a series of 22 sheep embryos, 21–40 days old, by serial sections impregnated by silver methods. Evidence is advanced in favour of the view that the spinal accessory nerve should be classified as visceromotor rather than as a somatic motor nerve, on the basis of the mode of origin of its nerve cells from the medullary epithelium. The original should be consulted by readers interested in the anatomical details.
—E. G. White.

See also abstr. **88** (leucocytes and lymphocytes), **279** (sex hormones), **94**, **95** (iris of the fowl), **120**, **121** (bovine heart and arteries).

POISONS AND POISONING

Ratliff, F. D. (1942). **Sodium Chloride Poisoning in Cattle.**—*Vet. Med.* **37.** 438–439. **201**

Intoxication in a herd of dairy cattle manifested as diarrhoea, ataxia, prostration and subsequent death of 15 out of 18 affected animals is attributed to over-indulgence in rain-wetted salt following a dry period of three weeks during which the salt is stated to have become too hard and not readily edible. The diagnosis of salt poisoning is considered to be confirmed by the finding of 0·5% sodium chloride in the rumen contents.

It is pointed out in a comment on the report that cattle, after being deprived of salt for longer periods than three weeks are not usually harmed when allowed free access to salt and that no observations are recorded on the water consumption of the affected animals. The possibility is recognized that cattle, like pigs, may be less tolerant of salt when water is not available than when they have free access to the latter, but it is considered that the small quantity of salt in the rumen tends to negate rather than to confirm the diagnosis.
—W. R. Muir.

Davidson, W. B., Doughty, J. L., & Bolton, J. L. (1941). **Nitrate Poisoning of Livestock.**—*Canad. J. comp. Med.* **5.** 303–313. **202**

The symptoms of 13 yearling steers which died out of a herd of 267 maintained on a diet containing oat straw, suggested that nitrate poisoning was the cause of death. Chemical analysis of the oat straw showed that it contained 3·46% KNO_3. To support a diagnosis of nitrate poisoning, artificial feeding experiments with watery extracts of oat straw were conducted in two steers, one horse, and five sheep. The extracts fed the steers and horse each contained 100 g. of KNO_3, and those fed to sheep varied from 3–58 g. With the exception of one sheep receiving the extract containing 3 g. of KNO_3, all animals manifested symptoms of poisoning and died. In a natural feeding experiment, one steer, from which food was withheld for 72 hours, consumed only $4\frac{1}{2}$ lb. of straw during six hours and was unaffected.

Methylene blue in 4% concentration injected intravenously is said to be a specific for methaemoglobinaemia which occurs in nitrate poisoning due to the action on haemoglobin of nitrites formed from nitrates. Pathological findings are recorded and also the histopathology of one case. The second part of the paper is concerned with chemical investigations of oat straw from different localities.—L. M. Heath.

Spira, L. (1942). **Fluorosis and the Parathyroid Glands.**—*J. Hyg., Camb.* **42.** 500–504. **203**

Support is given to the hypothesis that the primary disturbance in chronic fluorosis is centred in the para-

thyroids and that mottled teeth, certain dermatoses, mottled nails, and alopecia are secondary changes in tissues over which the parathyroids are said to exercise a regulatory function. The discussion is based on evidence drawn partly from the literature but mainly from S.'s own clinical observations, recorded elsewhere, on 1,099 human beings affected with mottled teeth.

It is now accepted that mottled teeth are caused by protracted ingestion of very small amounts of fluorine, but in S.'s subjects, lesions of the skin, nails, and hair were associated so frequently with this dental dystrophy that these, too, could be reasonably attributed to the same toxic agent. The diagnosis of chronic fluorosis is considered to be strengthened by the fact that paraesthesia of areas served by the ulnar nerve were a striking feature of the symptoms, and it is well known that fluorine is the only poison which affects the ulnar nerve. Moreover, the skin lesions failed to respond to all treatments except those designed to eliminate F intoxication. Other workers have recorded changes in the nails and hair of rats affected with chronic fluorosis.

The teeth, skin, nails, and hair (all ectodermal tissues) are said to be regulated by the parathyroids, and since lesions of the former are observed in chronic fluorosis, the conclusion is considered inevitable that the primary disturbance must occur in the parathyroids. Similar conclusions by other workers are quoted and attention is drawn to the close similarity of the dental dystrophies produced by experimental parathyroidectomy in rats and by chronic F intoxication in man. Parasthesiae and trophic changes in nails and hair have also been observed in parathyroidectomized rats. Macroscopic and microscopic changes in the parathyroids of rats affected with chronic fluorosis are described from reports by other workers, but the contrary opinion of Hauck *et al.* [(1933). *Amer. J. Physiol.* **103.** 480.] is quoted that these changes are insufficient to interfere with the functional activities of the glands as a whole. Mention is also made of the failure of Sutro [(1935). *Arch. Path.* **19.** 159.] to prevent the appearance of mottled teeth by subcutaneous injections of parathyroid extract.—W. R. Muir.

Anderson, H. D., & Moxon, A. L. (1942). **Changes in the Blood Picture of the Dog Following Subcutaneous Injections of Sodium Selenite.**—*J. Pharmacol.* **76.** 343–354. **204**

Subcutaneous injection of sodium selenite solution into dogs under barbital depression caused marked increases in haemoglobin and haematocrit values with loss of fluid into the body cavities. This movement of fluid was probably due to direct action on the blood vessels since the blood pressure did not rise and, at autopsy, the mesenteric blood vessels were engorged and beaded. The levels of inorganic P, non-protein N, and sugar decreased and the changes were greater than could be explained by the loss of fluid from the blood. Plasma ascorbic acid rose very sharply at first and then fell. Two relatively resistant dogs showed high levels and striking increases in plasma ascorbic acid and it was found that injections of ascorbic acid did exert some favourable effect against a minimum fatal dose of the selenite, since the usual increase in the concentration of blood cells was greatly reduced and the survival period was extended. Subcutaneous injections of sodium selenite produced more uniform responses than intraperitoneal injections or oral administration.

The minimum fatal dose of sodium selenite for dogs under barbital depression was found to be 1·5–2 mg. selenium per kg. bodyweight when injected subcutaneously.

It was necessary to place the experimental animals under barbital depression, since administration of selenites provokes severe griping pains and actions which make it difficult to obtain regular blood samples and blood pressure measurements.—W. R. Muir.

Rössing, P. (1941). Zur Frage der Leberschädigung, insbesondere der Leberzirrhose nach Arsenvergiftung. **[Liver Injury, Especially Cirrhosis, in Arsenic Poisoning].**—*Arch. Gewerbepath. Gewerbehyg.* **11.** 131–142. **205**

This article consists mainly of a review of the relevant literature, both clinical and experimental, but contains one original case report. The thesis is advanced that true "Laennec's cirrhosis" does not arise from the action of arsenic alone, and that in published cases (including the one cited) some other agent such as alcohol, lead, copper, nicotine, or infection was associated with the arsenic. Especial significance is attached to a combination of lead and arsenic.

Hepatic changes in acute arsenical poisoning are listed as damage to the reticulo-endothelial cells, desquamation and necrosis of hepatic cells, catarrhal jaundice and acute yellow atrophy. In chronic arsenical poisoning the sequence is given as disappearance of glycogen, fatty change, necrosis of the hepatic cells, attempted repair, acute yellow atrophy, and proliferative changes in the bile ducts and possibly in the periportal connective tissue.—Alastair N. Worden.

Reiche. (1942). Vergiftungen durch Wasch- und Beizmittel. **(Poisoning by Cleansing Agents and Caustics].**—*Dtsch. tierärztl. Wschr.* **50.** 450. **206**

R. mentions a number of deaths among cattle, horses, pigs, and goats which he attributes to the drinking of water used for washing, containing soap, soda, and various cleansing agents. The usual finding at autopsy was inflammation of the stomach and duodenum. Chemical analysis was not carried out and the evidence in favour of poisoning by "washing suds" is not always convincing. An exception is the case of a cow given a bucket of soap suds instead of a bucket of whey: the animal was slaughtered *in extremis* a few hours later.—E. G. White.

Cameron, G. R., Milton, R. F., & Allen, J. W. (1943). **Toxicity of Tannic Acid. An Experimental Investigation.**—*Lancet.* **245.** 179–186. **207**

The possible harmful results of the treatment of burns by tannic acid were investigated in goats, rabbits, g. pigs, and rats. Tannic acid applied to large burned skin surfaces was absorbed and liver necrosis developed; the chemical picture was that of a severe anhydraemia, the extent depending on the amount of tannic acid used. The authors give a valuable method which they used for the estimation of tannic acid in plasma.

After intravenous injection of tannic acid, the level of tannic acid in the plasma rapidly reaches a high peak which decreases rapidly, but after subcutaneous injection the concentration in the plasma rises more slowly but also falls slowly.

[This work is interesting to the veterinary pathologist because of the similar features shown in cases of "grass disease" in horses and bracken poisoning in cattle to that shown in tannic acid poisoning.]—G. D. S.

Steyn, D. G. (1941). **Fungus-infected and Fermented Feeds Dangerous to Stock.**—*Fmg S. Afr.* **16.** 197 and 208. **208**

This is a notice written for farmers. Well known fungi such as *Diplodia zeae* and *Claviceps paspalum* are mentioned. The highly complicated factors concerned in mixed fungus infections in feeds are discussed, and it is stated that the capacity of a particular fungus to cause toxin formation may vary. Feeds with a high protein content are the most dangerous when so affected. The

symptoms and P.M. changes in food poisoning due to fungi are described. The role of dust from fungus-infected foods in causing respiratory irritation is also described.

S. concludes that poisoning of cattle with native mealie (maize) meal and kaffir corn (maize) porridge residues is due to fermentation, with the production of toxic substances. Such fermentation may also cause lead and zinc from the receptacles to be dissolved into the residues; and the possibility of poisoning by these metals should also be considered.—E. M. ROBINSON.

ALLEN, P. H. (1943). **Poisonous and Injurious Plants of Panama.**—*Amer. J. trop. Med.* **23.** Suppl. No. 1. pp. 76. **209**

This is an extremely valuable and interesting account of plants or seeds which, if consumed by human beings, may cause injury or poisoning. Many photographs of the plants are produced with their botanical and common names. They have been divided into the following categories: A. Stomach Poisons, B. Purgatives and Emetics, C. Vesicants and Irritants, D. Urticants (nettles), E. Spines and Thorns, F. Ant plants (species inhabited by stinging ants). Where possible the chemical nature of the harmful substance contained in the plant is described, but in the large majority of cases this is unknown.—G. D. S.

STRERATH. (1942). Vergiftungen durch Kohlweisslingsraupen bei Enten. [**Poisoning of Ducks by Cabbage White Caterpillars**].—*Dtsch. tierärztl. Wschr.* **50.** 449–450. **210**

Owing to a serious plague of caterpillars of the Cabbage White butterfly, it was recommended in the press that ducks should be allowed in gardens to keep down the pests. Symptoms seen in the ducks 24 hours afterwards were inappetence, prostration, and paralysis; in some cases death followed. Autopsy showed no significant lesions. Most of the birds recovered within 48 hours. The flesh of such ducks was found to be quite fit for human consumption after thorough cooking.—E. G. WHITE.

HARRIS, J. S., & KOHN, H. I. (1943). **The Chronic Toxicity of the Sulfonamides for the Growing Rat as Influenced by the Type of Diet, the Addition of Feces to the Diet, and Appetite.**—*J. Pharmacol.* **78.** 56–64. **211**

The effect of adding sulphonamides to a diet of commercial dog food was to limit the appetite of young rats and so to cause a limitation of growth. Addition of sulphonamides to a synthetic diet caused a different kind of limitation of growth, characterized by a period when the growth rate fell below that of the control, a period when no growth or a loss of weight occurred, and a period when the animal became accustomed to the drug and growth was resumed. The order of toxicity of various sulphonamides was different when the animals were fed on the two different diets, thus further suggesting that different processes were involved. The addition of a small amount of dried faeces to the synthetic diet plus sulphonamide tended noticeably to counteract the effect of the drug. The possibility that the sulphonamides limit weight increase by preventing the synthesis of a growth factor by intestinal bacteria is discussed.—R. MCANALLY.

SELYE, H., & HALL, C. E. (1943). **Pathologic Changes Induced in Various Species by Overdosage with Desoxycorticosterone.**—*Arch. Path.* **36.** 19–31. **212**

Administration over a period of several weeks or months of large doses of desoxycorticosterone acetate to dogs, monkeys, and rats failed to produce any marked retention of water or tissue oedema. In the dog, simultaneous administration of large doses of NaCl also failed to increase water retention, but caused severe motor disturbances which in some cases progressed to paralysis and death. Withdrawal of NaCl brought about recovery even if administration of cortical hormone was still continued. It appears that the dog can tolerate very large doses of cortical hormone as long as NaCl intake is kept within reasonable limits. The paralytic effects of the synergic action of the hormone together with NaCl are probably due to electrolytic disturbances, but it is not known whether these occur primarily in the brain or muscles or in both situations.

Striking histological changes occurred in the kidneys. In the dog there was marked glomerular and peri-glomerular sclerosis. In the monkey and rat there was also a peculiar invagination of the cells of the proximal convoluted tubule into the capsular space.

The fowl is very sensitive to desoxycorticosterone acetate and much more susceptible to NaCl toxicity than are mammals. Overdosage with the hormone very readily produces nephrosclerosis in the fowl.

—E. G. WHITE.

WATSON, J. F. (1943). **Mustard Gas Poisoning in the Horse.**—*Vet. Rec.* **55.** 338. **213**

A case report of a Welsh pony which became contaminated through grazing near an area in which mustard gas was used in a military exercise. The symptoms included extreme nausea, profuse salivation, obvious pain in the mouth region, and fits of coughing accompanied by slight dyspnoea. Examination showed large wrinkled areas of dead skin in the mouth, involving the inside of both lips, cheeks, and the tongue which was very swollen and painful. Numerous large ulcerous sores were apparent on the mucous membrane, but no other visible lesions were present. Flushing of the mouth with sodium bicarbonate solution followed by swabbing three times daily with a solution of 1 : 1,000 acriflavine resulted in recovery.—R. ALLCROFT.

MACE, D. L., & UDALL, R. H. (1943). **Veterinary Corps Considerations of Chemical Warfare.**—*Army vet. Bull., Wash.* **37.** 185–217. **214**

In the first part of this article dealing with the prevention and treatment of animal casualties, the properties and physiological effects of chemical warfare agents are described including the lung irritants, vesicants, lachrymators, sternutators, systemic poisons, screen smokes, incendiary agents and other incidental gases such as CO, NH_3 and nitric fumes. In the section dealing with vesicants a new class, the nitrogen vesicants, is briefly described. It is stated that extensive liquid exposures of laboratory animals to these agents may result in lesions of the nervous and haemopoietic systems and of the gastro-intestinal tract. The nervous system lesions are manifested by salivation, lachrymation, muscular tremors and flaccid paralysis of muscle groups, beginning with muscles of the head and neck. The methods of individual and collective protection of animals against chemical warfare agents are also discussed.

In the second part, contamination, decontamination, and protection of food and forage supplies are dealt with. As officers of the U.S. Veterinary Corps will have to decide whether or not food is suitable for human consumption, this aspect is discussed in some detail.—R. ALLCROFT.

DOWGIALLO, J. (1942–43). **Food and Poison Gas.**—*Vet. J.* **98.** 185–191 & 231–239, and **99.** 12–17. **215**

D. tabulates the poison gases in four main groups according to their persistency, their danger before and after destruction, and their ability to contaminate food

material; he describes in detail the properties of the common foods which make absorption of the gases possible, and gives methods for their protection and decontamination. Contaminated animals can be slaughtered and used for food if their skin is decontaminated. Sensory, chemical and biological tests for the detection of contamination are indicated, together with symptoms of poisoning, and first aid treatment. —J. P. GARDNER.

GOLDMAN, L. (1943). **Some Medical Problems of Vesicant Chemical Warfare Agents as Affecting Civilian Populations.**—*Bull. N.Y. Acad., Med.* **19.** 57–72. **216**

The properties of, and the symptoms produced by, the vesicants are described with special reference to mustard gas and lewisite. Methods of protection, prophylaxis and treatment of the lesions are discussed. —J. P. GARDNER.

PULLINGER, B. D., & MANN, I. (1943). **Avascular Healing in the Cornea.**—*J. Path. Bact.* **55.** 151–158. **217**

The histology is described of lesions in the eyes of rabbits due to liquid dichlorodiethylsulphide and to some other chemical agents such as formaldehyde, hydrochloric acid and hydrogen peroxide. As was shown in a study of the clinical pathology of these lesions [see MANN & PULLINGER—*V. B.* **13.** 260.], spontaneous avascular healing occurred when the corneo-scleral junction was uninjured and free from oedema. Eighteen eyes in 12 different rabbits were examined microscopically and also a large number which vascularized for a short time. Five of the rabbits were injected with vital dye to determine the nature of the cells which invade the cornea. Frequent observations of the eyes were made with the slit lamp during life.

Rabbits which had a pigmented corneo-scleral junction provided a macroscopically visible demonstration of epithelial healing by sliding or migration of cells over the denuded area. Invasion of the substantia propria, during healing, by wandering cells in numbers far greater than normal was observed in animals injected with dye during life. It was found that many of the wandering cells functioned as macrophages and that others were transformed into fibrocytes, into keratoblasts, into satellite cells around the keratoblasts and injured but recovering corneal corpuscles, and even into corneal corpuscles themselves.—R. ALLCROFT.

See also absts. **103** (poisoning in calves), **280** (poisonous plants), **257** (mustard gas).

THERAPEUTICS AND DISINFECTION

WAKSMAN, S. A., & SCHATZ, A. (1943). **Strain Specificity and Production of Antibiotic Substances.**—*Proc. nat. Acad. Sci.* **29.** 74–79. **218**

In order to investigate the influence of strain specificity in connexion with the production of antibiotic substances, 15 different strains of *Aspergillus clavatus* were studied for formation of clavacin [see also *V. B.* **13.** 226, abst. 1513]. A simple synthetic medium, the Czapek-Dox, was used. It was found that the highest antibacterial activity of the culture corresponded with the maximum growth period as measured by the complete utilization of the sugar and maximum utilization of the nitrogen. After this maximum activity had been reached, the yield of extracted material remained constant, but the activity of the clavacin diminished rapidly; this was due not to the disappearance of the substance itself from the medium but to its inactivation. Of the 15 strains of *A. clavatus* studied, only six produced considerable amounts of clavacin while the others gave only traces. The strains differed greatly in their metabolism; the reaction of the medium of the six active strains remained distinctly acid and the reaction of the inactive strains, except one, changed to alkaline. The clavacin produced by the different strains appeared to be the same biologically and chemically. It is concluded that a single species of a fungus may contain many strains that vary greatly in their capacity to produce antibacterial substances and therefore conclusions regarding the antibacterial activity of an organism based upon type cultures obtained from collections may be misleading.—R. ALLCROFT.

I. WHITE, E. C., & HILL, J. H. (1943). **Studies on Antibacterial Products Formed by Molds. I. Aspergillic Acid, a Product of a Strain of Aspergillus Flavus.**—*J. Bact.* **45.** 433–442. **219**

II. JONES, H., RAKE, G., & HAMRE, D. M. (1943). **Studies on Aspergillus Flavus. I. Biological Properties of Crude and Purified Aspergillic Acid.**—*Ibid.* 461–469. **220**

III. MCKEE, C. M., & MACPHILLAMY, H. B. (1943). **An Antibiotic Substance Produced by Submerged Cultivation of *Aspergillus flavus*.**—*Proc. Soc. exp. Biol., N.Y.* **53.** 247–248. **221**

I. The method of isolation and the properties are described of a crystalline substance, aspergillic acid, obtained from cultures of a strain of *A. flavus* grown on a tryptone medium. Dilutions of 1 : 25,000 were bactericidal for *Bacterium coli*, group A streptococcus, pneumococcus type I and *Str. faecalis* within 12 hours; 1 : 50,000 killed *Staphylococcus aureus* in two hours, but was only bacteriostatic for the other organisms. Toxicity tests on mice showed that the tolerated dose was about 4 mg. per 20 g. mouse. *In vivo* experiments showed that aspergillic acid had no protective action in mice infected with haemolytic streptococci or pneumococci type I, but there was some indication of beneficial action in mice infected with gonococci and in g. pigs with gas gangrene infections.

II. A study of the frequent variants obtained from a strain of *A. flavus* resulted in the isolation of two which gave much higher yields of aspergillic acid than those reported in I as coming from the mixed parent strain. The media found to give the greatest yield of aspergillic acid were one which contained 2% tryptone and 0·5% NaCl, and others in which 1, 2 or 4% dark brown sugar was added to the simple tryptone-salt base. At first *Str. pyogenes* was used as the test organism for the routine assaying of activity, but this required a wait of 18 hours for incubation before the results could be read. It was then found that the interference of aspergillic acid with the bioluminescence of *Photobacterium fischeri* could be used to assay the activity and by this method assays could be read within 30 min. and the results were found to parallel very closely those obtained with *Str. pyogenes*. The wide range of activity of aspergillic acid was demonstrated by its antibacterial action against *Str. pneumoniae, Staph. aureus, Bacterium friedländeri, Salmonella enteritidis, Bact. coli*, and *Aerobacter aerogenes*; crystalline preparations were also found active against *Clostridium perfringens, Cl. sporogenes, Cl. bifermentans, Cl. septicum, Cl. histolyticum* and *Cl. novyi*.

III. A preliminary report is given of the production of an antibacterial substance from a strain of *A. flavus* when grown in submerged culture, which is entirely different from aspergillic acid [see I & II]. The

biological and chemical characteristics of this substance closely resemble those of penicillin.—R. ALLCROFT.

I. KOCHOLATY, W. (1943). **Purification and Properties of the Second Antibacterial Substance Produced by Penicillium Notatum.**—*Science.* **97.** 186–187. 222

II. KOCHOLATY, W. (1943). **Purification and Properties of Penatin. The Second Antibacterial Substance Produced by Penicillium notatum Westling.**—*Arch. Biochem.* **2.** 73–86. 223

I. Further details on the properties and preparation of penatin are briefly described [see also *V. B.* **13**, 403, abst. 2721]. It is reported that the bacteriostatic power of penatin not only surpasses the purest preparations of penicillin, but is effective against organisms not affected by penicillin, notably some Gram-negative organisms. Of 50 pathogenic and non-pathogenic organisms tested, none was found to be resistant to penatin in dilutions of not less than 1 : 10 millions and the purest preparations obtained were bacteriostatic to certain organisms in dilution of 1 : 400 millions.

II. The method of purification and properties of penatin are described in detail. The optimum production of penatin was obtained on the seventh day of growth of *P. notatum* (Westling) " 77 " on a modified Czapek-Dox medium. After filtration of the culture, a purified preparation of penatin was obtained from the filtrate by adsorption on kaolin at pH 4, elution of the washed kaolin with pyridine or sodium phosphate at pH 6·3 and precipitation of the penatin by dioxane ; the dioxane precipitate was dissolved in water and dried. The dry preparation is a light yellow hygroscopic powder completely soluble in water and stable for months in the refrigerator ; it gives protein reactions and displays its antibacterial properties only in the presence of glucose which is decomposed by penatin with the formation of hydrogen peroxide. This and other properties of penatin suggest that penatin and notatin [see *V. B.* **13.** 186, abst. 1242b] are probably very similar if not identical substances. Toxicity tests with g. pigs and rabbits showed that fairly large amounts of purified penatin can be tolerated when injected intramuscularly and that small amounts can be injected intravenously without obvious ill effects.—R. ALLCROFT.

UNGAR, J. (1943). **Synergistic Effect of Para-aminobenzoic Acid and Sulphapyridine on Penicillin. [Correspondence].**—*Nature, Lond.* **152.** 245–246. 224

When dilutions of *p*-aminobenzoic acid (PAB) of 1 : 2,500–1 : 10,000 were added to a synthetic medium in which the bacteriostatic activity of penicillin was being tested against *Bacillus subtilis*, it was found that the inhibitory effect of the penicillin on the organism was increased from a titre of 1 : 100 to 1 : 6,000. A similar, but less marked, effect on penicillin activity was shown by PAB against *Staphylococcus aureus* (strain 663), but PAB had no effect on the activity of penicillin against *Streptococcus haemolyticus* (strain 618, group A) ; PAB did not increase the activity of penicillin in concentrations greater than 1 : 1,000.

It was also found that sulphapyridine had an even greater enhancing effect on penicillin than PAB had. Dilutions of sulphapyridine up to 1 : 2,000 had no inhibitory effect on staphylococci (strain 663) in digest broth, but when dilutions of sulphapyridine up to 1 : 50,000 were added to a solution of penicillin which inhibited at 1 : 30,000, inhibition occurred up to a titre of 1 : 70,000. The activity of penicillin against staphylococci (strain 663) and streptococci (strain 618) was also increased in the presence of sulphapyridine when a 1% glucose broth was used.

Preliminary *in vivo* experiments on mice infected with *Str. haemolyticus* and *Staph. aureus* confirmed the *in vitro* results, showing that sulphapyridine and penicillin given together exerted a much greater protective action than either substance given alone. It therefore appears that the inhibitory effect of penicillin is at least doubled in the presence of small quantities of sulphapyridine which *per se* are insufficient to show any effect on staphylococci or streptococci.—R. ALLCROFT.

PAGE, J. E., & ROBINSON, F. A. (1943). **An Examination of the Relationship between the Bacteriostatic Activity and the Normal Reduction Potentials of Substituted Quinones.**—*Brit. J. exp. Path.* **24.** 89–95. 225

The hypothesis that bacteriostatic activity is dependent upon oxidation-reduction potential was tested by correlation of the above physical property of a series of 20 substituted quinones with their bacteriostatic activity towards *Bacterium coli* and *Staphylococcus aureus*. With the former organism, no connexion was found, but with the latter all the active quinones had reduction potentials between −0·1 and +0·15 volt. A similar test with 18 commercial oxidation-reduction indicators and citrinin and penicillic acid revealed no correlation. It is concluded that, although oxidation-reduction potential may play a part, there are many other factors involved in bacteriostatic activity.
—R. MCANALLY.

HAGER, G. P., & GRUBB, T. C. (1942). **A Study of the Bacteriostatic Activity of Fluoro and Bromo Derivatives of Some Organic Acids.**—*J. infect. Dis.* **71.** 228–231. 226

The bacteriostatic activity towards *Salmonella typhi* and *Staphylococcus aureus* of benzoic, cinnamic, mandelic, and phenyl acetic acids and of their ortho-, meta- and para-fluor and para-brom derivatives was studied. Of the unsubstituted acids, cinnamic was the most active. Substitution of fluorine somewhat enhanced the activity and substitution of bromine enhanced it considerably. The brom derivatives further showed a differential effect towards the two organisms ; the suggestion is made that this property may be found useful in suppressing contaminating staphylococci in blood cultures of typhoid.—R. MCA.

GOODWIN, L. G., & PAGE, J. E. (1943). **A Study of the Excretion of Organic Antimonials Using a Polarographic Procedure.**—*Biochem. J.* **37.** 198–209. 227

An electrometric polarographic method was used for the estimation of tervalent and quinquevalent antimony after reduction, in urine directly, and in blood after precipitation of protein with sulphosalicylic acid. The excretion by mice of injected stibophen, stibacetin, stibamine glucoside, neo-stibosan, urea stibamine, and sodium antimony gluconate was 30–40% in the first two hours, but excretion of tartar emetic and anthiomaline was initially less rapid. No measurable amount of antimony could be detected in the blood after three hours.—R. MCANALLY.

KIRBY, W. M. M. (1943). ***In vitro* Action of Urea-Sulfonamide Mixtures.**—*Proc. Soc. exp. Biol., N.Y.* **53.** 109–111. 228

The use of urea with sulphonamides in wound treatment is discussed. Concentrations of urea of 0·2–2·0% were bacteriostatic towards *Bacterium coli*. Urea had no effect upon the anti-sulphonamide action of *p*-aminobenzoic acid in cultures of the same organism, nor did it promote the activity of sulphonamides upon strains of the organism which were normally resistant.
—R. MCANALLY.

WEBER, C. J., LALICH, J. J., & MAJOR, R. H. (1943). **Metabolism of Sulfapyridine in the Dog.**—*Proc. Soc. exp. Biol., N.Y.* **53.** 190–192. 229

As much as 80% of the diazo-reacting substances which appear in the urine of dogs which have been given sulphapyridine is in the form of a hydroxy derivative of sulphapyridine conjugated with glucuronic acid. —R. McANALLY.

LEBOWICH, R. J. (1943). **Chemotherapy of Experimental Streptococcic Pericarditis. A Comparison of Sulfanilamide and an Acetylated Derivative of 4,4′-Diaminodiphenylsulfone Hydrochloride in the Treatment of Experimental Beta Hemolytic Streptococcus Pericarditis in the Rabbit.**—*Arch. Path.* **35.** 253–274. 230

Groups of 50 rabbits were inoculated into the pericardium with a strain of β-haemolytic streptococci which, in untreated animals, produced a rapidly fatal pericarditis. Treatment with an acetylated product of 4,4′-diaminodiphenylsulphone hydrochloride, started 12 hours after inoculation, cured 49 out of 50 animals. When the treatment was delayed for a longer period, the results were less favourable. Treatment with sulphanilamide, begun four hours after inoculation, had only a slightly beneficial effect and no animals of this group survived. The toxicity of this compound is relatively low.—J. M. ROBSON.

KAPLAN, M. M., RAIZISS, G. W., & MOETSCH, J. C. (1942). **The Pathogenicity of Streptococcus Agalactiae for Mice and Treatment with Sulfanilamide and a Derivative.**—*Amer. J. vet. Res.* **3.** 392–394. 231

The virulence of a strain of *Str. agalactiae* for mice was enhanced by passage; after five passages, 1 ml. of a blood broth culture [concentration of organisms not given] invariably proved fatal. Attempts were made to protect groups of mice against lethal doses of this broth culture by using suspensions of sulphanilamide and sodium formaldehyde sulphoxylate-sulphanilamide given by stomach tube. These attempts to overcome the infection failed even when the dose of drug given was 20 mg. every six hours. Although these two drugs had no protective effect on mice inoculated intraperitoneally with a new peptone blood broth culture containing 14 million organisms, both protected mice inoculated with a suspension of 255 million organisms in saline. —D. L. ROBARTS.

SANDERS, D. A. (1943). **The Preparation and Use of Sulfanilamide in Iodized Mineral Oil for Mastitis.**—*N. Amer. Vet.* **24.** 40–42. 232

Using the microscopic examination of incubated milk samples as the criterion of cure, 90% of 50 lactating quarters of mastitis-infected cows were considered to be freed from infection by intramammary injections of sulphanilamide in iodized mineral oil.—D. L. ROBARTS

GERSTL, B., & TENNANT, R. (1943). **Effect of Sodium Salt of Cinnamoyl Glycerol Phosphatidic Acid on Lesions Produced by Tubercle Phosphatide.**—*Proc. Soc. exp. Biol., N.Y.* **52.** 154. 233

Since the phosphatide of the tubercle bacillus is causatively related to tubercle formation and to the proliferation of epitheloid cells [see SABIN—*V. B.* **12.** 494.] and in view of results indicating that cleavage of this phosphatide is effected in the mammalian organism by lecithinase and a phosphatase [see GERSTL & TENNANT—*V. B.* **13.** 348.], search was made for a compound that would require the same enzymes for its breakdown without yielding the enzyme-inhibitory fatty acids produced by the phosphatide cleavage. By the use of such a compound administered in increasing doses, it appeared that the activity of the two enzymes might be augmented, a result which might hasten tubercle phosphatide breakdown and thereby prevent or reduce tubercle formation.

Results are presented indicating that cinnamoyl glycerol phosphatidic acid (SCG) appears to fulfil these preliminary requirements, the tests being carried out on rabbits infected intraperitoneally with a single dose of 210 mg. phosphatide during a course of intravenous SCG injections (total given 435 mg.) and assessed by the fact that, two months after phosphatide injection, the omenta of the treated group were either normal or showed slight diffuse fibrosis, while those of the controls exhibited large proliferative nodules with caseous necrosis and surrounding fibrosis.—J. L. MCGIRR.

FELDMAN, W. H., HINSHAW, H. C., & MOSES, H. E. (1943). **Therapeutic Effects of Disodium Formaldehyde Sulfoxylate Diaminodiphenylsulfone in Experimental Tuberculosis.**—*Arch. Path.* **36.** 64–73. 234

Forty-two adult male g. pigs were inoculated subcutaneously with 0·0005 mg. of human type tubercle bacilli (strain H37 Rv), and 46 days' therapy with disodium formaldehyde sulphoxylate diaminodiphenylsulphone was commenced, 14 animals being treated while the remaining 28 served as controls. The drug was incorporated in the food in amounts equivalent to 0·66% by weight, the estimated daily intake being 325–350 mg. per animal per day.

When the experiment was terminated (228 days after infection), 71% of the control group and 14% of the treated group had died. P.M. examinations revealed markedly less TB. in the treated group than in the controls, and histological evidence indicated that, whereas the disease process in the latter animals was typical of unrestrained and progressively destructive TB., that in the former group was minimal in extent and in an arrested, non-progressive state.

In the dose used, the toxicity of this drug for g. pigs appears to be less than that of its parent substance, 4–4′ diaminodiphenylsulphone; on the other hand, the latter appears to be the more effective of the two drugs in deterring g. pig TB. [Similar findings regarding the action of this drug were recently recorded by CALLOMON—*V. B.* **13.** 303.]—J. LOCHIEL MCGIRR.

RODIONOV, I. M. (1940). Lechenie strigushchevo lishaya. **[Treatment of Ringworm].**—*Sovyet. Vet.* No. 8/9. pp. 43–45. 235

Hairs infested with *Microsporon equi* were exposed to the action of various solutions, after which they were washed and sown upon meat-peptone agar and incubated for 30 days. A 10% alcoholic solution of brilliant green destroyed the spores after exposure for 20 min., whereas spores exposed for one hour to the action of a 10% alcoholic solution of gentian violet, crystal violet, methylene blue, pyoctanin, and 10% salicylic alcohol remained viable.

Single or double dressing of affected horses by 10% brilliant green and 10% iodine in alcohol was successful.—A. MOLDAWSKY.

SANDGROUND, J. H. (1943). **Detoxication of a Substituted Phenyl Stibonate in the Rat by Administration of *p*-Aminobenzoic Acid.**—*Proc. Soc. exp. Biol., N.Y.* **52.** 188–190. 236

Experiments are reported demonstrating that administration of *p*-aminobenzoic acid (PAB) at the same time as stibosan protects rats against the toxic effects of the pentavalent antimony compound. Two groups of 11 and 12 rats respectively each received one dose of 380 mg. per kg. of stibosan, one of the groups also receiving 1 g. per kg. PAB on four successive days; 90% of those which received the PAB survived and none of those not receiving PAB survived. In two other similar groups which had 300 mg. per kg. stibosan, 100% of those receiving the PAB survived and 40% survived of those which did not get any PAB. It was also demonstrated that PAB did not interfere with the trypanocidal activity of stibosan.—R. ALLCROFT.

SANDGROUND, J. H., & HAMILTON, C. R. (1943). **Studies on the Detoxication of Organic Arsenical Compounds. I. Detoxication by Means of *p*-Aminobenzoic Acid of Certain Pentavalent Arsenical Drugs Given in Massive Doses to Rats. II. Correlation of the Quantity of *p*-Aminobenzoic Acid Required to Protect Rats against High Doses of Carbarsone and Arsanilic Acid.**—*J. Pharmacol.* **78.** 109–114 & 203–208. **237**

SANDGROUND, J. H. (1943). **Studies on the Detoxication of Organic Arsenical Compounds. III. The Time-Factor Influencing p-Aminobenzoate Protection of Rats Receiving Lethal Doses of Phenyl Arsonates.** —*Ibid.* 209–214. **238**

I. As it has been demonstrated [see MARSHALL *et al.*—*V. B.* **13.** 31.] that *p*-aminobenzoic acid (PAB) inhibits the action of sulphonamides that are active against the malarial parasites, the question whether a similar mechanism explains the susceptibility of pathogenic trypanosomes to certain pentavalent arsenicals was investigated because of the structural relationship between the arsenic compounds and sulphanilamide. Three groups of rats infected with *Trypanosoma equiperdum* were given daily one of the following treatments —(1) intravenous injection of 1,000 mg. per kg. of PAB, (2) intravenous injection of 1,000 mg. per kg. of PAB plus a single small subcurative dose of carbarsone (*p*-carbaminophenyl arsonic acid), and (3) daily doses of PAB plus a high dose (500 mg. per kg.) of carbarsone. The results showed that PAB *per se* was not trypanocidal nor did high doses of PAB interfere with the trypanocidal action of carbarsone. It was, however, observed that, in contrast to previous experience, none of the rats receiving the high dose of carbarsone+PAB died before the 15th day, while most of them survived the full 30-day observation period. Further experiments were carried out with rats to investigate the detoxicating action of PAB with carbarsone and other pentavalent arsenical compounds, *viz*, tryparsamide, acetarsone, arsanilic acid, and phenyl arsonic acid. As much as 1–3 g. of PAB per kg. body weight daily were given for 3–5 days with massive doses (about LD_{100}) of the arsenicals. In each case PAB was found to be very effective in reducing the fatalities among rats to which high acutely poisonous doses of the arsenicals were given. The protective action of the PAB could be detected in the majority of rats within 24 hours of administration. Detoxication was independent of the route by which either the arsenic compound or the PAB was given. Also no inhibition by PAB of the trypanocidal action of the various arsenicals was observed.

II. In an investigation of the quantitative relationship between the protective action of PAB and the toxicity of pentavalent arsenicals, a freshly prepared 10% or 20% aqueous solution of PAB was given to rats either orally or intraperitoneally while a solution of the sodium salt of the arsonate was injected some minutes later, usually into the abdominal cavity. Carbarsone and arsanilic acid were used as two typical phenyl arsonates. Taking 1,200–1,500 mg. per kg. as the minimum universal lethal dose of carbarsone (LD_{100}), it was found that all rats were protected against this dose by the prior administration of 750 mg. per kg. of PAB followed by the same quantity on two subsequent days. Whether a smaller quantity of PAB would have been equally beneficial was not determined. To determine the lower extreme of the protective range of PAB, single diminishing doses were administered to several groups of rats which received injections of carbarsone or arsanilic acid at a rate approximating the LD_{90} respectively of these two compounds (1,000 mg. per kg. of carbarsone or 400 mg. per kg. of arsanilic acid). 500 mg. per kg. PAB was sufficient to confer protection on nearly all rats that received the LD_{90} of carbarsone, while virtually total protection was afforded by 250 mg. per kg. PAB against the LD_{90} of arsanilic acid. Below these levels partial protection for the group as well as for individual rats was observed. It was found that a single injection of PAB was capable of conferring the protection.

III. Further experiments showed that the length of time of the administration of PAB before or after administration of the pentavalent arsenical compound significantly influenced the survival rate of the group. "Neutralization" of the lethal effects of the arsenical was fully achieved when both PAB and arsenical were administered simultaneously (mixed) or when PAB was administered within one hour (in the case of carbarsone), or up to three hours (in the case of arsanilic acid) before the arsenical. When, however, the arsenical was injected before the PAB, as short an interval as 15 min. for carbarsone and 30 min. for arsanilic acid was associated with a significant reduction in the detoxicating action of PAB; a greater lapse of time was associated with an almost directly proportional loss of protection. In a discussion speculating on the mechanism underlying this detoxicating action of PAB, it is stated that PAB does not confer much protection against lethal doses of the trivalent arsenicals, with the possible exception of neoarsphenamine.—R. ALLCROFT.

BRUMPT, L. C. (1943). Efficacité de la quinacrine ou atébrine dans le traitement des coccidioses des animaux domestiques. **[The Use of Quinacrine (Atebrin) in the Treatment of Coccidiosis of Domestic Animals].**—*C.R. Soc. Biol. Paris.* **137.** 144–145. **239**

The experiments here reported were carried out with naturally infected cats. Quinacrine, a valuable schizonticide, in a 1% solution, was administered at the rate of 0·01 g. per kg. body weight. The treatment proved efficacious, as indicated by oocyst counts, when the dose was given for five successive days. The number of oocysts decreased from the second day of treatment, but complete cessation of oocyst production was not observed. The safety margin of the drug is large and 0·1 g. per kg. was given without ill effects to cats, dogs, rabbits, pigeons, and fowls. Coccidiosis of domestic rabbits has been treated with some success and tests are being made with the drug in connexion with bovine coccidiosis. [See also *V. B.* **11.** 640, and **12.** 512.]—C. HORTON SMITH.

SEELER, A. O., DUSENBERY, E., & MALANGA, C. (1943). **The Comparative Activity of Quinine, Quinidine, Cinchonine, Cinchonidine and Quinoidine against Plasmodium Lophurae Infections of Pekin Ducklings.** —*J. Pharmacol.* **78.** 159–163. **240**

The relative activities of the drugs against the schizonts of *P. lophurae* were tested. *P. lophurae* responds to the administration of drugs which are effective in human malaria. Pekin ducklings weighing about 50 g. were inoculated intravenously with 2,000,000 parasitized erythrocytes and the course of the infections was followed by daily parasite counts beginning on the fourth day after inoculation. It was found that the four cinchona alkaloids, *viz*, quinine, quinidine, cinchonine, and cinchonidine showed about equal activity against schizonts. Data on the activity of samples of totaquine (a mixture of the cinchona alkaloids) and quinoidine (the residue following the extraction of the crystalline alkaloids) showed that quinoidine was much less active and more toxic than the four crystalline cinchona alkaloids. Two samples of totaquine, varying widely in their quinine content, were as active as quinine. The acute oral toxicity of the four crystalline alkaloids in the mouse differs little, but cinchonine is slightly more toxic than the other three.—C. HORTON SMITH.

COGGESHALL, L. T., & MAIER, J. (1942). **Effect of Various Sulfonamides, Sulfones, and other Compounds Against Experimental Influenza and Poliomyelitis Infections in White Mice.**—*J. Pharmacol.* **76.** 161–166. **241**

The 25 drugs tested were not effective in delaying or preventing the development of the disease, nor in reducing the mortality from the infection. These negative results are thought worth recording as many of the compounds tested were representatives of large groups of related chemicals.—R. ALLCROFT.

SCHMID, G. (1943). Versuche über Läusebekämpfung beim Pferd. [**Control of Lice in Horses**].—*Schweiz. Arch. Tierheilk.* **85.** 206–209. **242**

Two horses badly infested with lice were treated by a single application of 400 g., and two applications four days apart, respectively, of a powder containing 5% of 4-dichlordiphenyl-trichlormethylmethane as the active principle. This powder was lethal to lice in four and seven days and to eggs in 16 and 18 days respectively and the horses were still free from lice at the end of ten weeks.—J. B. CRAGG.

I. *JAUSS. (1941). Läusebekämpfung. [**Control of Lice on Horses**].—*Z. Veterinärk.* **53.** 325. **243**

II. *KOCH, H. (1941). Behandlung von Läusen bei Pferden mit "Durosept" und "Petroleum-Kalkwasser-Emulsion". [**Treatment for Lice on Horses by "Durosept" and a Mineral Oil + Limewater Emulsion**].—*Inaug. Diss., Hanover.* **244**

[Absts. from absts. in *Zbl. Bakt. I.* (*Ref.*). **142.** 479].

I. Whilst *in vitro* tests showed that nicotine acetate, Eau de Javelle (potassium hypochlorite solution) and "Durosept" killed horse lice in a short time, these substances gave different results when tested out on lice-infected horses. At the strength employed [the German abstract gives no details], nicotine acetate solution killed both lice and eggs. Short-coated horses required only one treatment but for long-haired animals, two treatments separated by an interval of 2–3 days were necessary. A single treatment of Eau de Javelle may be sufficient to kill lice on smooth-coated horses, but even three treatments may not render long-haired types free from lice. "Durosept" was without sufficient action as a delousing agent on both types of horses.

II. A single treatment with a 2% solution of "Durosept" was found to be sufficient to kill both lice and eggs on short-coated horses, but 2–3 treatments were necessary for long-coated horses. "Durosept" has the disadvantage that it renders the coat sticky and is thus liable to cause an irritation. A mineral oil + limewater emulsion (oil 1 part, limewater 5 parts) is claimed to be effective.—J. B. CRAGG.

IRVING-BELL, R. J. (1943). **The Value of Lethane 384 (Special) in the Control of Pediculosis.**—*J. R. sanit. Inst.* **63.** 124–126. **245**

A brilliantine consisting of 40% lethane 384 (special) (12·5% *N*-butyl carbitol thiocyanate, 37·5% β-thiocyanatethyl laurate, and 50% refined paraffin) in refined petroleum oil is recommended for the treatment of human head louse infestation. It kills the eggs as well as the lice, is easy to apply and does not appear to cause irritation to the head or to the hands of the operator. Vermin infestations in buildings may be controlled by spraying in atomized form a 7·5% solution of lethane in kerosene.—W. MOORE.

HORNBY, R. B. (1943). **Benzyl Benzoate Treatment of Sarcoptic Mange.**—*Vet. Rec.* **55.** 310. **246**

Three puppies with sarcoptic mange were treated by washing the affected parts first with soap and water and then with a 33⅓% solution of benzyl benzoate. Four days after the first application the treatment was repeated. No toxic effects were observed and within a fortnight of the initial treatment all lesions had disappeared.—W. MOORE.

DENNELL, R. (1943). **Pore Canals of the Insect Cuticle. [Correspondence].**—*Nature, Lond.* **152.** 50–51. **247**

In some insects, the pore canals may be transformed into solid structures, which prevents the entry of contact insecticides. D. suggests that a renewed examination of the cuticle of a number of diverse insects should be made, because there appears to be considerable doubt as to the mechanism of insecticide penetration through the cuticle.—W. MOORE.

BALDWIN, E. (1943). **An *in vitro* Method for the Chemotherapeutic Investigation of Anthelmintic Potency.**—*Parasitology.* **35.** 89–111. **248**

B. has used segments of *Ascaris* for testing the efficiency of anthelmintic drugs *in vitro*. Two *Ascaris* preparations were used, the "anterior" and the "intermediate". The former consists of the anterior 2 cm. of the worm and contains the "nerve ring" in which are found most of the ganglion cells of the worm. The "intermediate" preparation consists of about 2 cm. taken from just in front of the genital pore. It contains no ganglion cells and corresponds to a ganglion-free muscle-nerve preparation. With these two preparations, it was possible to decide whether the drug acted chiefly on the nerve ganglia or not. The activity of the preparations was recorded by a kymograph, the effect of the drugs being determined by the alteration in the tracing when the saline medium in which the segment was placed was changed for a similar medium containing a known concentration of the drug to be tested. Tests were carried out on 17 substances whose identity was unknown to the person making the tests, and it was found that they could be divided into two groups, "active" and "inert", corresponding to anthelmintic activity and the absence of such activity. In the "active" group, two substances had been duplicated. From the nature of the tracings in these cases, the investigator was able to deduce that the substances, if not identical, were closely related. It was interesting to note that phenothiazine had no action on either preparation. B. does not suggest that this method of testing anthelmintics replaces *in vivo* tests, but claims that it is useful in selecting from groups of new synthetic products substances of anthelmintic potency which can be further tested *in vivo*.—T. E. GIBSON.

OLSEN, O. W. (1943). **Preliminary Observations on Hexachloroethane for Controlling the Common Liver Fluke, Fasciola Hepatica, in Cattle.**—*J. Amer. vet. med. Ass.* **102.** 433–436. **249**

A study was made on the use of hexachlorethane to control fascioliasis under field conditions near Angleton, Texas, using range cattle whose condition varied from strong, fat animals to extremely weak, emaciated ones, including lactating and non-lactating cows, and those in all stages of gestation. The drug was prepared as an aqueous drench by mixing 500 g. commercial hexachlorethane of technical grade, 50 g. bentonite, and 750 ml. water to make 1 litre of suspension. The cattle received this suspension by a drench syringe at the rate of 20 ml., containing 10 g. hexachorethane, per 100 lb. live weight, and showed no ill effects from the treatment. Doses containing up to 100 g. of the drug produced no symptoms of toxicity and it was found unnecessary to fast animals before or after treatment. Faecal examinations made on rectal samples taken at the time of treatment and again 2–3 weeks afterwards disclosed that 91% of 209 infested animals treated showed no liver-fluke eggs at the second

examination. One out of ten bulls repeatedly examined 5–20 weeks after drenching showed an infection rate of 4 E.P.G. after about five months, but this animal had remained on infected pasture from the time of dosing and could have become reinfected after treatment. Examinations made P.M. on five animals infested at the time of treatment showed that four were free of infection shortly after dosing but a fifth, which had shown 196 E.P.G. when treated and appeared to be negative two weeks later, was found to harbour a few flukes four months afterwards.—J. N. OLDHAM.

WEHR, E. E., & OLIVIER, L. (1943). **The Efficacy of Barium Antimonyl Tartrate for the Removal of Gapeworms from Pheasants.**—*Proc. helminth. Soc. Wash.* **10.** 87–89. **250**

It has already been shown [see *V. B.* **9.** 802.] that barium antimonyl tartrate, when inhaled as a dust, is very effective for the removal of *Syngamus trachea* from chickens and turkeys. The authors have found that this drug, inhaled in a dosage of 24–29 g. per 8 cu. ft. of box space, is practically 100% effective for the removal of gapeworms from experimentally infected pheasants. —M. L. BINGHAM.

I. LEWISOHN, R., LASZLO, D., LEUCHTENBERGER, C., LEUCHTENBERGER, R., & DISCHE, Z. (1943). **Presence in Various Grains of Factors Inhibiting Tumor Growth.** —*Proc. Soc. exp. Biol., N.Y.* **52.** 269–272. **251**

II. LEWISOHN, R., LEUCHTENBERGER, C., LEUCHTENBERGER, R., LASZLO, D., & DISCHE, Z. (1943). **Treatment of Spontaneous Breast Cancers in Mice with Pearled Barley.**—*Ibid.* 272–273. **252**

I. The observations of LEWISOHN *et al.* [*V. B.* **13.** 326.] were extended and with the same assay method it was found that growth-inhibiting substances were present in brown rice, pearled barley, and soya bean. The beneficial effect of oats, wheat flour, and maize meal was less evident. Intravenous injections of an extract of pearled barley are said to have been effective.

II. Repeated intravenous injections of an extract of pearled barley are stated to have caused the disappearance of spontaneous mammary carcinomas in 19 out of 46 mice so treated.—ALASTAIR N. WORDEN.

KÜST, & SCHAETZ, F. (1943). Die Behandlung der Endometritis bei Pferd und Rind mit einem Surfen-Jod-Gemisch. **[Treatment of Endometritis in Mares and Cows with Surfen-Iodine Mixture].**—*Dtsch. tierärztl. Wschr./Tierärztl. Rdsch.* **51/49.** 26–27. **253**

A colloidal suspension of iodine (Merco-Jod) is stated to be an excellent uterine antiseptic, but is now difficult to obtain in Germany. This note describes results given in detail in two dissertations, with a mixture of 8 ml. of 2% surfen [bis-2-methyl-4-aminoquinolyl-6-carbamide] and 4 ml. of 5% tincture of iodine in 1 litre of water. The preparation is stable, and has given very good results with cattle and horses. One treatment usually suffices to effect a cure, and all cases treated were cured by two applications.—J. G. C.

KERNKAMP, H. C. H., & ROEPKE, M. H. (1943). **Sulfaguanidine in the Treatment of Infectious Enteritis in Swine.**—*Amer. J. vet. Res.* **4.** 3–14. **254**

The observations previously noted [*V. B.* **13.** 189.] are recorded in detail, and it is stated that, in the case of animals which are able to eat, the drug is effective when administered as a suspension in a small amount of mash or thick swill. A similar dosage (0·16–0·33 g. per kg. body weight) is recommended.

Toxicity trials were continued, and it was found that daily doses of 0·66–2·2 g. per kg. body weight gave rise to toxic symptoms, beginning with inappetence in 4–6 days. A dose of only 0·43 g. per kg. body weight also produced toxic symptoms when fed for the long period of 29 days. The inappetence of affected animals was followed by locomotor incoordination, which was manifested at first by a stiff upward and forward movement of the hind legs when walking and later passed to general weakness. There was also a leucocytosis. P.M. findings of significance were confined to the kidneys, which were enlarged and contained white crystals in the pelves. A marked tubular degeneration was observed on histological examination.—A. N. W.

CHAMELIN, I. M., & FUNK, C. (1943). **The Action of Liver Extracts in Counteracting the Toxic Effects of Diethylstilbestrol and Sulfanilamide.**—*Arch. Biochem.* **2.** 9–14. **255**

Under standard conditions, the amounts of diethylstilboestrol and of sulphanilamide found necessary to produce a 50% mortality in rats within 1–2 days, when injected intraperitoneally, were 650 mg. and 400 mg. respectively per kg. body weight. These values appeared to be almost independent of age and weight. Simultaneous injection of whole liver extract, in doses equivalent to 100 mg. per kg. body weight, halved the mortality rate and decreased the weight losses in surviving animals, the action being apparently analogous in the case of both drugs.

In subsequent experiments carried out with mice, whole liver extract diminished the toxicity of sulphanilamide, but did not impair its bacteriostatic action against *Streptococcus haemolyticus*.—A. N. WORDEN.

HOLMAN, R. L., & DONNELLY, G. L. (1942). **Hypoproteinemia as Protection Against Mercuric Chloride Injury in Dogs.**—*J. exp. Med.* **76.** 511–518. **256**

A single intravenous injection of 3 mg. per kg. body weight of mercuric chloride killed every one of 12 normal dogs in 4–11 days, there being marked nitrogen retention and severe tubular nephritis with necrosis and calcification. The same dosage appeared to be without clinical or histological effect upon three dogs which had been reduced to a standard state of hypoproteinaemia following repeated plasmapheresis. This was in marked contrast with the results earlier reported for uranium nitrate.

Plasmapheresis after the injection of mercuric chloride to normal dogs did not appear to influence the toxicity.—ALASTAIR N. WORDEN.

DOROGOV, A. V. (1940). Pervaya pomoshch' krupnomu rogatomu skotu pri aplikatsii iprita na kozhy. **[First Aid for Cattle Injured by Mustard Gas].**—*Sovyet. Vet.* No. 8/9. pp. 66–68. **257**

To each of the four skin areas of 50 sq. cm., 254 mg. mustard gas in droplets were applied. Tenderness was observed 10–50 min. after application; the area became swollen on the second day and indurated 3–5 days later. There was formation of a compact crust on the 10th day and the demarcation began on the 19th–22nd day. Among general symptoms, restlessness was observed 1–1½ hours after application, followed by loss of appetite, drop in milk yield, lachrymation, profuse diarrhoea, and depression. After ten days the symptoms gradually subsided. The milk from contaminated animals was harmless when fed to mice, rabbits, lambs, and calves for 20 days after exposure.

The results of decontamination measures undertaken 15–30 min. after exposure were more successful than those taken one hour after exposure. Among decontaminants, 5% chlorinated lime is considered the most efficient; a disadvantage being that it is a skin irritant. Dry chlorinated lime and 5% potassium permanganate were also reliable. A mixture of soft soap and paraffin and chlorinated lime paste is not recommended. Beneficial results were obtained by simul-

taneous intravenous infusion of 5% calcium chloride for 8–10 days in succession. [The number of animals used for the experiments is not stated.]—A. M.

McCulloch, E. C., Fuller, S. A., & Koger, L. M. (1943). **The Disinfection of Baby Chick Shipping Boxes with Sodium Silicate Solutions.**—*Amer. J. vet. Res.* **4.** 95–99. **258**

A simple method is described of disinfecting cardboard containers used for conveying baby chicks. With the knowledge that strong alkalies have a powerful disinfectant action on Gram-negative organisms, the authors carried out a series of tests with various dilutions of commercial waterglass. The phenol coefficient of these varied from 0·1–0·2, the more alkaline mixtures being more germicidal.

A 10% solution of waterglass in ordinary water was found to kill *Salmonella pullorum* in 5 min. in the absence of organic matter. When chick faeces were present, this time was somewhat longer. Under practical conditions following the rough mechanical scraping of the boxes, equal parts of waterglass and water brushed on to the cardboard proved completely effective against most poultry pathogens particularly *S. pullorum*, but did not destroy *Mycobacterium tuberculosis*.

—N. S. Barron.

See also absts. **37** (treatment of rabbit syphilis), **202** (of nitrate poisoning), **193** (disinfectants).

HYGIENE AND PUBLIC HEALTH

Chapman, G. H. (1939). **The Value of Biochemical Properties in Studies of Staphylococcus Food Poisoning.**—*Proc. 6th Pacific Sci. Congr., 1939.* **5.** 377–393. **259**

An analysis of the literature on the food-poisoning staphylococci. It is stressed that biochemical reactions alone are not sufficient to differentiate a food poisoning type from a pathogenic staphylococcus not associated with food poisoning. By biochemical methods, however, there can be identified a group of non-pathogenic staphylococci not concerned in food poisoning. The issue is complicated by the fact that certain enterotoxin-producing strains are not associated with food-poisoning outbreaks, whereas strains isolated from outbreaks may lose their enterotoxigenic power. Various biochemical tests are discussed, especially the Stone and Dolman tests which, although lacking in specificity may usefully be combined with other biochemical tests in assessing the significance of a strain.—D. L. Roberts.

Cherry, W. B., Scherago, M., & Weaver, R. H. (1943). **The Occurrence of *Salmonella* in Retail Meat Products.**—*Amer. J. Hyg.* **37.** 211–215. **260**

Samples of meats and of various meat products were collected from retail markets and examined for the presence of salmonella, Kauffmann's tetrathionate enrichment and Leifson's selenite enrichment methods being used. Of the 250 samples examined, 13 (5·2%) were found to be positive and the incidence was greater in pork and pork products than in beef and beef products. Lamb and chicken samples were negative. The evidence indicates that the source of the salmonella was the animals from which the meat samples were obtained and that the meat was not contaminated in the markets.—M. H. Kyaw.

Spencer, H. A. (1942). **Disease Caused by Eating Uncooked Flesh of Dead Animals.**—*S. Afr. med. J.* **16.** 367–368. **261**

An account of a number of cases met with in practice where disease in man apparently resulted from the ingestion of uncooked meat. Two cases are recorded in natives of what was diagnosed as pharyngeal or laryngeal TB., associated with the eating of uncooked or imperfectly cooked goat's meat. In neither case was TB. definitely diagnosed in the goats nor was the diagnosis in the natives confirmed; TB. is very rare in goats in South Africa. Several cases are recorded of malignant pustules on the lips in natives who had eaten meat from an anthrax-infected ox carcass and other cases associated with contact of the body with anthrax-infected skins.—E. M. Robinson.

Wright, W. H. (1943). **Public Health Problems Concerned in the Disposal of Garbage by Feeding It to Swine.**—*Amer. J. publ. Hlth.* **33.** 208–220. **262**

Statistics are given of the extent of the practice of feeding garbage to pigs in the U.S.A., and of the incidence and source of human trichinosis, in order to illustrate how disposal of garbage by feeding it uncooked or undercooked to pigs constitutes an important means of spreading human trichinosis and of potential spread of other human disease. After discussion of the objections of pig-keepers to the cooking of swill, evidence is given in support of the feasibility and economy of so doing. Methods of processing garbage and types of equipment now in use are described, with illustrations and details of cost and operation.—R. O. Muir.

Elton, C. (1942). **The Natural Control of Rodent Populations.**—*Proc. 6th Pacific Sci. Congr., 1939.* **5.** 109–114. **263**

Recent population studies have thrown considerable doubt upon the presumed efficacy of control measures hitherto adopted against rodent outbreaks. Investigations undertaken [see also abst. 102.] in parts of the world where there is little or no human interference with the natural operation of population laws among rodents show that the species fluctuate on a grand scale over large areas. The importance of studying rodent population dynamics has become greater since the discovery of rodent-borne human diseases, while the growing speed and capacity of transport is breaking down the faunal individuality of continents and islands and is aiding the establishment of a common world fauna consisting of those species (*e.g.* the rabbit, grey squirrel, black and brown rats, muskrat, etc.) that have the highest ecological competitive powers.

The question whether or not epidemic disease is the main limiting factor to rodent populations at high levels, is being investigated at the Bureau of Animal Population, Oxford, and it is hoped that the results of the research will provide a means of applying rational control of numbers. Introduced disease has hitherto proved either a complete failure or undesirable, whilst poisoning campaigns as at present conducted are very costly and are responsible for an ecological disturbance which may even defeat the object of the control.

—Alastair N. Worden.

TECHNIQUE AND APPARATUS

Angulo, J. J. (1942). Una solución al problema de la termolabilidad de los azúcares para pruebas de fermentación en microbiología. Segunda Parte. **[Solution to the Problem of Thermolability of Sugars Used for Fermentation Tests in Microbiology. II].** —*Rev. Med. trop. parasit., Habana.* **8.** 81–83. [English summary]. [See also *V. B.* **13.** 379]. **264**

A hypodermic syringe is connected through a

three-way valve (automatic or provided with a tap) to a hypodermic needle, and to a vaccine flask containing the sugar solution. The valve allows semi-automatic filling of the syringe from the flask and emptying of its contents into the fermentation tube. The operation is carried out under a source of ultra-violet light in order to ensure aseptic conditions.—Isobel W. Burton.

Bray, J., & King, E. J. (1943). **The Phosphatase Reaction as an Aid to the Identification of Micro-Organisms Using Phenolphthalein Phosphate as Substrate.**—*J. Path. Bact.* **55.** 315–320. 265

Phenolphthalein phosphate was incorporated in Dorset's egg medium. When organisms producing phosphatase were inoculated on to plates made from this medium, the enzyme split the phenolphthalein phosphate, liberating phenolphthalein. Treatment of the plate with ammonia vapour then coloured the liberated indicator red. A number of organisms of medical importance were examined and classified according to the presence, absence, and strength of their phosphatase activity. It is suggested that the test may be applicable to differentiation between members of certain genera.—R. McAnally.

Davis, J. G., Newland, L. G., & Knuckey, P. B. (1943). **The Resazurin and Rapid Resazurin Tests—Their Relation to Other Bacteriological Tests and Mastitis.**—*Dairy Indust.* **8.** 23–29, 71–77 & 115–119. 266

The authors deal with the effect which mastitis may have upon the result of a resazurin test of milk. It is well known that the presence of a large number of cells will influence the reduction time of resazurin and that the reducing effect of freshly taken samples is almost entirely due to the cells present. In the case of methylene blue, this effect is partial and temporary, the dye being quickly reoxidized by air. If reduction is due to bacteria it is, however, not reversible. The oxidation of resazurin is in any case not reversible, thus the effect of a high cell count as in the case of mastitis (in excess of 1,500,000 per ml.) will have a marked effect. With an estimated 10% infection by the chronic type of mastitis throughout the herds of the country, the dilution in bulk milk samples will be such that milk in the salvage and rejection groups will not be affected, the heavy bacterial count alone being responsible for the grading. If, however, mastitis is widespread in a herd this will be revealed by the resazurin test and the milk will be graded down.—N. S. Barron.

Cadness-Graves, B., Williams, R., Harper, G. J., & Miles, A. A. (1943). **Slide-Test for Coagulase-Positive Staphylococci.**—*Lancet.* **244.** 736–738. 267

A simple rapid slide test is described for the determination of coagulase-positive staphylococci. It consists in emulsifying the suspect colony in a drop of water and mixing the emulsion with a drop of human plasma. Positive strains are clumped within 15 sec. In a preliminary series of 442 strains of staphylococci, of which 282 were proved coagulase positive by tube test, 280 were positive to the slide test. In a later series of 860 strains, 558 were coagulase positive by tube test, and 492 by slide test. This indicates that strains coagulase negative to the slide test must be tested by the tube test. For the rapid presumptive identification of potentially pathogenic staphylococci, this test should prove of great value.—D. L. Robarts.

Massey, K. M. (1943). **Notes on Tetrathionate Broth and MacConkey's Agar Media in the Isolation of *Salmonella enteritidis* var. *dublin* from Bovine Faeces and Milk.**—*J. comp. Path.* **53.** 151–156. 268

The efficacy was compared of direct plating on MacConkey's medium and of plating on that medium after preliminary growth in tetrathionate broth, for the isolation of *S. dublin* from fresh milk and saline suspensions of bovine faeces, artificially infected by admixture with a stated volume of successive dilutions of broth culture containing a known number of bacilli. Whereas the directly plated MacConkey's cultures showed a very few salmonella colonies amidst a heavy growth of lactose fermenters, plates spread from tetrathionate broth cultures gave a heavy, practically pure growth of salmonella colonies. The smallest number of organisms detectable per ml. of faecal suspension by the use of tetrathionate broth varied from 15 to 1, compared with 255 to 15 by the direct plating method, in which the few salmonella colonies present might well be overgrown by the normal faecal flora. Preliminary growth in tetrathionate broth had the added advantage that a much larger volume of faecal suspension or milk could be inoculated into it than could be spread directly on a plate to yield isolated colonies.—R. O. Muir.

Barkworth, H., & Irwin, J. O. (1943). **Comparative Detection of Coliform Organisms in Milk and Water by the Presumptive Coliform Test, with an Appendix on the Possible Bactericidal Effect of Bile Salt.**—*J. Hyg., Camb.* **43.** 129–135. 269

Experiments were conducted in order to ascertain whether with inoculation of a unit number of coliform organisms similar numbers of positive "presumptive tests" would occur in milk and in water, or whether, as there was reason to expect, a small proportion of false negative results would occur in the milk samples. The results made it clear that "presumptive" coliform tests in milk underestimate the coliform population. The cause of this is not known, but since the test is an enrichment test, if the organisms did grow it would be expected that they would attain sufficient numbers in 72 hours to give a positive result. If the lower percentage of positives was the result of a failure to grow, it must have been due to competition or residual bactericidal action. The method by which the samples were obtained suggests that the balance of species in the incubated samples was probably not the same as would be found in market milk of the same count after similar storage. If the difference was due to bactericidal action, this must persist for more than 24 hours under the conditions of storage used. Bile salt was found to have no inhibitory action on coliform organisms in the presumptive coliform test.—H. V. Hughes.

Fallis, A. M. (1943). **Use of the Waring Blendor to Separate Small Parasites from Tissues.**—*Canad. publ. Hlth J.* **34.** 44. [Only abst. given]. 270

In the isolation of parasitic larvae from tissues, by digestion, young larvae may be destroyed and digested sooner than the tissues themselves. The use of the Waring blendor appears to overcome this difficulty. Tissue is placed in a small volume of saline in the apparatus [no details given] which is allowed to operate for a short time until the tissue is broken into small particles. The larvae are then recovered from the mixture by centrifugation.

By this method, *Ascaris lumbricoides* has been separated from intestine, liver, and lung tissue, and *Trichinella spiralis* from muscle.

La Rosa, W. V. (1943). **A Test Paper for the Rapid Estimation of the Level of Sulfonamide in Serum.**—*Proc. Soc. exp. Biol., N.Y.* **53.** 98–100. 271

The preparation is described of test papers impregnated with *p*-dimethylaminobenzaldehyde (Ehrlich's reagent) dissolved in hydrochloric and phosphoric acids. The papers, which are colourless and which give a pale violet colour when a drop of normal human serum is

spread over them, give a yellow colour with serum containing sulphonamides. The concentration of sulphonamide may be judged by comparison of the colour with standards. Good agreement was obtained between estimations of sulphadiazine in serum by this method and by a standard method. The stability of the papers on keeping was not established. Inaccurate results may be obtained with serum containing pathological concentrations of protein.—R. McANALLY.

See also absts. **5** (mastitis), **23** (individual mouse jar), **66** (antibody detection), **74** (diagnosis of taeniasis), **277** (spectrophotometry), **281** (chromatography).

MISCELLANEOUS

HOWARD, A. (1943). **A New Policy for Veterinary Science.**—*Vet. J.* **99.** 74–80. **272**

H. gives a brief description of the methods he advocates for the growing of healthy crops, by ensuring the best natural soil conditions with regard to humus, *viz*, his well known Indore method. The next step is to find out whether animals resistant to diseases and parasites can be produced by feeding them on plant food produced by H.'s method. A report on such an experiment is shortly expected.—J. E.

DEDIÉ. (1942). Die italienische Veterinärverwaltung in Äthiopien. Aus "La construzione dell' Impero", Mailand 1940, Bd. III. **[Italian Veterinary Organization in Italian East Africa.** (From "La Construzione dell' Impero", Milan 1940, vol. III)].—*Dtsch. tierärztl. Wschr.* **50.** 219–220 & 259. **273**

Conditions prevailing in 1939 in Abyssinia and adjacent territories occupied by Italy are briefly renewed. The incidence of the various livestock diseases in Harrar, Asmara, Galla-Sidama, Shoa, Eritrea, and Italian Somaliland is tabulated, but the list is not complete, nor are statistical data given. Rinderpest is common throughout, but bovine contagious pleuro-pneumonia and African horse sickness are less important diseases. Anthrax, coccidiosis, and distomatosis are also pandemic, other diseases showing a more limited distribution.

Veterinary activities and their political, economic, and hygienic implications are discussed, with special reference to the role of the veterinarian as interpreter of Italian colonial policy and as an educator in livestock improvement. At the administrative stage under review, approximately 80 Italian veterinary officers were stationed at 55 centres in Abyssinia, and a number of native assistants, 120 in Asmara alone, were employed after a brief period of training. Apart from the work done at the centres, mobile units were engaged in curative and prophylactic activities in the less populous districts. Native opposition to rinderpest immunization and other measures had shown a marked decrease.

As well as the old and greatly extended veterinary institutes in Asmara and Merca, the one in Addis Ababa was already partly finished, while those of the remaining three provinces and a second in Eritrea, near Tigre, were only begun. The work of these institutes was largely concerned with the preparation of immunizing agents, especially against rinderpest.

Some of the difficulties encountered in the introduction of animals for breeding purposes are indicated. Cattle imported from Kenya were affected by anaplasmosis, theileriasis, and rinderpest. Sheep, also partly from Kenya, often contracted heartwater on the journey to Galla-Sidama and Shoa, but uleron treatment was effective. Horse and donkey stallions brought to Harrar and Galla-Sidama sickened with piroplasmosis. Karakul sheep in Somaliland did not flourish in spite of supplementary feeding, and there were losses from Nairobi sheep disease. All imported animals were liable to plant poisoning, and it is suggested that they lacked the instinct to avoid poisonous species possessed by native animals.—J. H. KENNETH.

—. (1942). **European Agriculture: Scientific Problems in Post-War Reconstruction. Transactions of a Conference of the Division for the Social and International Relations of Science, March 20-21, 1942, and other Contributions. Report of the British Association for the Advancement of Science.**—*Advanc. Sci.* **2.** No. 6. pp. 121–184. London: British Association. [8vo] [5s.] **274**

The subject of this Conference was post-war agricultural reconstruction in Europe, and was largely restricted to the initial stages, where agriculture first supplements relief measures, and then replaces them. Authoritative representatives of the various countries took part in the discussions, which offer an interesting and matter-of-fact picture of the problems involved. Crops and human nutrition were considered of more pressing urgency than the reintroduction of livestock, but significant papers were read by HAMMOND on artificial insemination, by M. A. FJELSTAD on some aspects of the livestock problem of the small farmer, by PEDERSEN on milk production on peasant farms, with special reference to conditions in Denmark, and by BRAUDE on milk production on small farms in Poland.
—E. S.

GROMYKHIN, P. S. (1940). Horizontal'naya ventilyatsiya s zapolnitelem v pomeshcheniyakh dlya zhivotnykh. **[Horizontal Ventilation in Animal Houses].**—*Sovyet. Vet.* No. 8/9. pp. 79–85. **275**

G. discusses the horizontal ventilation, "aerator", recommended by BORSHCHEVSKIĬ. The system is based on the fact that the zone below the ceiling is the most stagnant, and has the highest temperature. This area influences the air which comes into contact with the animals. Adequate ventilation of this part of the building prevents the condensation of water on the walls and ceiling and lowers the concentration of ammonia and carbon dioxide in the air. The "aerator" system, however, is complicated and requires reconstruction of the buildings. G. recommends a simple modification which consists of slots in the wall below the ceiling, above or between the windows; into these slots are fitted boxes 0·5–1·5 metres long and 0·3 metre wide the sides of which are of netting and which are filled with straw or other suitable material to prevent draught. G. claims that in two premises where this simplified method was adopted, considerable lowering of moisture, ammonia, and carbon dioxide content of the air was registered. Some useful diagrams are given.—A. M.

BOSMAN, V. (1941). **The Recording of Merino-Sheep by Nose-Prints.**—*Fmg S. Afr.* **16.** 45–47. **276**

Previously methods of identifying Merino sheep have always been unreliable and cases have occurred where the identity of valuable stud animals could not be established. Recording by nose-prints resembling the method of taking finger prints in man has proved an infallible method for identifying Merino sheep. The print is taken from the portion of the nose above the upper lip between the two nostrils. Finger print ink is used and the print is taken with a piece of stiff white paper pressed against the nostrils. The prints are photographically enlarged for reference. Prints taken over a number of years show that the same sheep retains its nose-pattern in the course of successive years.
—E. M. ROBINSON.

BOOK REVIEWS

HEILMEYER, L. (1943). **Spectrophotometry in Medicine.** [Translated by JORDAN, A. (M.B., B.S. Lond., D.Sc. Strasbourg, M.R.C.P. Lond., Assistant Pathologist E.M.S.), & TIPPELL, T. L.] pp. xiv+280. 120 figs., 1 appendix. London: Adam Hilger Ltd. [8vo] [30s.] **277**

This book is the authorized translation of HEILMEYER'S *Medizinische Spektrophotometrie*. The German work was written in 1932 and, though much of the photometric technique has been brought up to date and some footnotes on recent work have been added, the book as a whole remains as it was then written, apart from the replacement of the symbols used in the German original by those now employed in this country.

The subject matter is arranged in six sections. The first of these gives a very good account of the theory and methods of spectrophotometry and concludes with a short supplement by the translators dealing with recently developed spectrophotometric apparatus. The application of the technique to whole blood and haemoglobin derivatives occupies the second section, while the third deals with haem, haematin, malarial pigment, and haematoporphyrin. This third section appears to be in need of considerable revision as the result of the chemical developments of the past ten years. The next section deals with blood serum and normal and pathological serum pigments: bile pigments and allied substances, and the lipochromes are discussed, but there is no mention of the now relatively common spectrophotometric determination of vitamin A in serum. Section five deals with the pigments of normal and pathological urines, and section six with bile, cerebrospinal fluid, exudates, and transudates. There is an extensive author index and bibliography, and a good subject index.

The book gives an excellent account of the theory and methods of spectrophotometry, and indicates the extensive potentialities of the technique in relation to the study of pathological specimens. Its users, however, will need to search the literature of the past ten years for information regarding recent applications of the method.—J. LOCHIEL MCGIRR.

ALLEMANN, O. [Dr. sc.techn., Dipl. ing. agr. E.T.H.] (1942). Ueber die Bedeutung des Vitamin D bei der Ernährung des Rindes unter besonderer Berücksichtigung des Einflusses verschiedener Konservierungsverfahren auf die Vitamin D-Wirkung von Grünfutter. **[The Importance of Vitamin D in the Feeding of Cattle, with special reference to the Effect of Different Methods of Preservation on the Vitamin D Activity of Green Fodder].**—*Z. Vitaminforsch.* Suppl. No. 2. pp. 84. Berne: Hans Huber. [8vo] [Swiss Fr. 5.50]. **278**

The account of the author's experiments is preceded by a review of the literature on the vitamin D requirements of cattle and the efficacy of various fodders as sources of the vitamin.

A uniform supply of red clover (*Trifolium pratense*) was made into silage, or dried in a variety of conditions of insolation or of irradiation with an ultra-violet lamp. Chemical analyses were made, including determination of the phytosterol content. The results are tabulated. Extracts of the plant materials were made with peroxide-free ethyl ether, and were tested on rats receiving a rachitogenic diet, in simultaneous comparisons with other rats receiving the international standard of vitamin D. The degree of rickets was assessed by X-ray.

Preliminary biological experiments with spinach, dried in the laboratory and irradiated, showed that the ether extract possessed the antirachitic activity of the solid material and that this was not due to the ash constituents. Other solvents were not as effective as ther. Similar preliminary experiments with lucerne, irradiated fresh, showed that antirachitic activity was not lost during drying in a current of air at 50°C.

In the main experiment with clover, the vitamin D content in I.U. per 100 g. dry matter was 26·5 for the fresh clover, untreated. The highest value was 149·5 for clover dried in the shade and irradiated with ultra-violet light, and for clover dried in the sun on the Scheidegg at 2,064 metres above sea level, the value was 139. Clover dried in the shade had a value of only 10·3 and values for silage were very low, 3 and 7·6 respectively for acid and molasses silages. Drying on a stand was not favourable for the production of high values.

The content of phytosterols did not appear to be adversely affected by any of the treatments.

Some studies are appended in which the content of micro-organisms in the different clover hays was investigated. Bacteria were found not to contain phytosterols, but irradiation evoked a high vitamin D content in cultures of species of yeast, *Torula* and *Penicillium*, isolated from the hays.—E. M. HUME.

—. (1942). **Biological Symposia. Volume IX. Sex Hormones.** [Edited by KOCH, F. C. (Chairman of the Department of Biochemistry of the University of Chicago), & SMITH, P. E. (Professor, College of Physicians and Surgeons, Columbia University)]. pp. x+146. Numerous figs. Lancaster, Pa.: The Jaques Cattell Press. [4to] [$2.50]. **279**

This book deals with two main aspects of the actions of sex hormones, namely, in part I with the metabolic changes which they undergo in the body and with some of the effects which they produce and, in part II with the experimental evidence concerning the rôle which the sex hormones play in the development of sex.

As MOORE clearly indicates in the introductory chapter to part I, a vast amount of information has now accumulated and it is necessary to try to interpret it properly. It is no longer possible, for example, to speak of the male and female hormones since both androgens and oestrogens are excreted in both sexes; an additional complication is that the suprarenal cortex is known to secrete substances with similar biological activities.

DOISY discusses the possible mode of production of oestrogens and their degradation in the body, while KOCH deals with the excretion and metabolism of androgen in health and disease. He discusses the problem of their assay by biological and chemical methods. The somatic changes involving growth and metabolism controlled by androgens are discussed by KENYON. The chapter on the metabolism of progesterone, referred to in the foreword, has unfortunately not been included.

In the second part, experimental sex inversions are discussed, in the plumage of birds by DANFORTH, in amphibia by HUMPHREY, in rats by GREENE, and in the opossum by BURNS. It is interesting that while complete sex reversal may be induced by the use of crystalline hormones in amphibia, this has not so far proved possible in higher animals. The discussion of experimental changes in rats in comparison with those which occur naturally in the bovine freemartin is of special importance.

This symposium thus deals with specialized aspects of the action of sex hormones and should prove not only interesting but stimulating to the reader.—J. M. R.

HURST, E. (1942). **The Poison Plants of New South Wales.** Sydney: Snelling Printing Works Pty. Ltd. [4to]. **280**

Authoritative works on the poisonous plants of a country are not frequently published and the appearance of this book is therefore welcome. It is a compilation of all available information regarding plants known or suspected to be poisonous to livestock in N.S.W., and whilst it refers to many plants that are indigenous to Australia, it also gives much information which has far more than Australian application. For instance, the section dealing with cyanogenetic grasses is of special interest to all stock-raising countries, containing as it does much detailed information concerning the lethal doses of such grasses, and the conditions under which mortality may be expected. The records and files of the New South Wales Herbarium, the Glenfield Veterinary Research Station, the Division of Animal Industry, Department of Agriculture, and the Department of Pharmacy, Sydney University were made available to Mrs. HURST who was thus able to include in the compilation much previously unpublished information. In their introduction to the volume, the Subcommittee of the Poison Plants Committee state that " any attempt to crystallise our knowledge of New South Wales poisonous plants must be preceded by the collection of all existing information and its arrangement in an accessible form. It must be remembered that for the most part this is a compilation of all existing information and opinions, and little attempt has been made to comment on such information and examine it critically". Although this warning applies to many of the earlier records quoted, much of the contents refers to recent experimental work. As the actual experiments are quoted, the reader will have little difficulty in appraising their significance. The book is illustrated with line drawings of the more important poisonous plants.

A curious omission is that of a table of contents.

The value of the book is enhanced by the extensive bibliography.—W. L. HINDMARSH.

ZECHMEISTER, L. [Prof. California Institute of Technology, Pasadena (California)], & CHOLNOKY, L. [Dr. Lecturer at the Chemical Institute, University of Pécs, Hungary]. (1943). **Principles and Practice of Chromatography.** [Translated by BACHARACH, A. L. (M.A., F.I.C., Biochemical Department, Glaxo Laboratories Ltd., Greenford, Middlesex), & ROBINSON, F. A. (M.Sc. Tech., F.I.C., Chemical Research Department, Glaxo Laboratories Ltd.)]. pp. xv+378. 74 figs. London : Chapman & Hall Ltd. [2nd Edit.] [8vo] [25s.] **281**

In 1906, TSWETT found that the pigments present in a light petroleum extract of green leaves were differentially adsorbed when the solution was passed through a vertical column of powdered calcium carbonate ; a yellow ring remained in the upper part of the column with two green zones below it and further down still three yellow bands. Since that time many different types of adsorption media have been developed, and the method has been modified and extended for use with colourless compounds. The science of chromatography deals with the separation of mixtures by differential adsorption-analysis of this type, the series of bands developed on the adsorption column being known as a chromatogram.

The volume under review is a translation of the second German edition of a book on chromatography written by the two Hungarian chemists, ZECHMEISTER and CHOLNOKY. Chapter I deals with the scope of chromatographic analysis and covers such topics as testing the homogeneity of a substance, establishment of the possible identity of two substances, concentration from great dilutions, separation of mixtures and stereoisomerides, purification, identification, and control of commercial products, and history and theoretical prospects of the method. The essentials of the technique are discussed in chapter II, a good account being given of adsorption media, solvents, elements, apparatus for large-scale and micro work, experimental procedure for the formation of the column and the development and extrusion of the chromatogram, and special methods for the chromatography of colourless substances. The remaining five chapters are devoted to applications of the technique to naturally occurring pigments (chlorophyll, haemin, porphyrin, bile pigments, carotenoids, naphthaquinone and anthraquinone pigments, flavins, pterins, and anthocyanins), to synthetic dyestuffs, to colourless and faintly coloured substances (including essential oils, sterols and bile acids, alkaloids, vitamins, hormones, and enzymes), to technology, and to inorganic chemistry. There are many diagrams, photographs, and graphical formulae throughout the text, and the comprehensive bibliography of the German edition (complete to the summer of 1938) has been supplemented by the translators with selected references to the literature up to 1941.

This book will appeal particularly to physical and organic chemists and to biochemists, but the veterinarian and scientific workers in other fields should find it interesting as a very well written and clear account of a new and valuable technique which has been added to the chemists' armoury.—J. LOCHIEL MCGIRR.

SMITH, R. C. [A.M., Ph.D., Professor of Entomology, Kansas State College of Agriculture and Applied Science, Manhattan, Kansas]. (1942). **Guide to the Literature of the Zoological Sciences.** pp. vii+128. Minneapolis, Minn. : Burgess Publishing Co. [4to] [$2.00]. **282**

This remarkable compilation should prove invaluable to the student or research worker in any of the natural sciences, who wishes to make the most efficient use of the available library services. Besides critical lists of abstracting and indexing journals, of works on the taxonomy of the animal kingdom and its various subdivisions, and of general works of reference likely to be useful to the zoologist, there is a great deal of useful information of a more general character. There is, for instance, a good brief account of several of the library classification systems in wide use in the U.S.A., and, in other sections, advice on the arrangement of card indexes and reference lists, and on the preparation of abstracts. Among many other points considered are the filing of reprints, the arrangement of footnotes, abbreviations, microfilms, the writing of scientific papers, and proof reading. There is considerable information about large scientific libraries of the U.S.A. and other countries, and a good account of the various catalogues available for the location of periodicals. So much information is given here in concise and helpful form that it should help to solve one of the real problems of the young scientist—how to find his way through the present maze of scientific literature so that he is able to turn the work of others to the best account in carrying out, criticizing, and publishing his own work.—E. S.

HASSALL, A., DOSS, M. A., TAYLOR, R. M., CARSON, G. B., & SEGAL, D. B. (1942). **Index-Catalogue of Medical and Veterinary Zoology.** Part 6. Authors : G to GYSER. pp. 1459–1754. Washington, D.C. : Superintendent of Documents. [8vo] [40 cents]. **283**

This was the last part of the index-catalogue to be published before the death of Dr. HASSALL, who had been so strong a moving spirit in the work ever since its inception in 1902. Parasitologists the world over will look forward to the completion of the work by his able collaborators, in spite of present difficulties, as a most fitting memorial to their careful and tireless chief.—E. S.

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INDEX VETERINARIUS

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